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Scenic Modelling

A PRACTICAL HANDBOOK ON THE PLANNING,
DESIGN, AND CONSTRUCTION OF SCENIC
MODELS, WITH SOME NOTES ON THOSE FOR
WINDOW DISPLAYS

BY

EDWARD W. HOBBS

VICKERS GOLD MEDALLIST

With 111 *Photographic Illustrations and Diagrams*

E09803

CASSELL AND COMPANY, LTD

London, Toronto, Melbourne and Sydney

First Published 1930

Printed in Great Britain

AUTHOR'S PREFACE

SCENIC models are now recognized as having many phases of practical interest, they afford the amateur an inexpensive hobby, provide advertisers with an inexhaustible store of attractive window displays, and play no mean part in the commercial development of Industry. Estate agents, architects, promoters of estate development and housing schemes too, have proved the worth of scenic models.

The subjects covered by the title vary enormously, as a perusal of these pages will show. The methods of construction and treatment are widely divergent, but they have one aim in common—the presentment in an agreeable form of an object, scene, or quality which could not be achieved so effectively by any other means.

In the pages of this book an attempt has been made comprehensively to survey the whole subject, giving examples of representative pieces and many practical hints on the construction of models of a like character.

Several chapters are devoted to materials, modes of manipulation, the principles of composition and design, based on experience gained during thirty years of varied practical work.

The author desires to acknowledge the courtesy of Messrs. Harrods, Ltd., Kodak, Ltd., The Gramophone Co., Ltd., Messrs. Selfridge, Ltd., Messrs. Bassett-Lowke, Ltd., Twining Models, Ltd., Partridge Models, Ltd., to the Director of the Science Museum, South Kensington, and John B. Thorp, Esq., for examples of their work. Also to the publishers of "How to Make Clipper Ship Models" and "Pictorial House Modelling" for the use of one or two illustrations.

EDWARD W. HOBBS.

London, W.1.

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SCENIC MODELLING

CHAPTER I

Introduction : Some Notable Examples

The Nature and Scope of Scenic Modelling.—The term "scenic model" is difficult of accurate definition, because it embraces such a large variety of pictorial models.

Some partake of the nature of a diorama, while others border on the province of the true scale model.

Perhaps the most comprehensive definition of a scenic model is that it represents a scene or group of objects in an attractive way, generally by the use of economical and homely materials, treated in such a manner as to convey a sense of realism and atmosphere.

The art of successful scenic modelling lies in knowing what not to model. The clever artist conveys with a few lines or splashes of colour an impression of an actual scene, and presents it in all the glowing vigour of actuality. In scenic modelling the aim should be much the same, the representation of a scene by implication and suggestion.

Variety of Subject Matter.—The subjects that can be treated in this way are enormous ; they may vary from a sectional model of a tiny insect many times the size of the original, to a small model of a grand natural scene such as those in the Himalayas, or the rugged grandeur of the New Zealand highlands.

On the other hand, a piece of intricate machinery cannot be so effectively dealt with by scenic methods.

Scenic Modelling as a Hobby.—Scenic modelling is an inexpensive hobby ; the results are attractive and pleasing to look upon, and almost anything can be dealt with substantially by the methods described in this book.

One difficulty is that so much of the work is artistic in essence, and has to be done according to the ideas of the individual.

Written instructions cannot completely explain the subtle means by which the various colours are blended and treated so that they represent, say, a sunset sky, or by a change of colour and theme, a stormy sky in winter.

Colour and Paintwork.—The importance of colour and paintwork is mentioned first because it takes such a prominent part in scenic modelling.

Much the same conditions are met with on the purely constructional side of the work, the materials being handled freely and dealt with in what often appears to be a haphazard way; the worker seldom follows elaborately dimensioned drawings, or works to a thousandth of an inch accuracy. On the contrary, the aim is to represent what is seen or comprehended, to mould the material to a mental picture, disregarding detail in favour of the demands of the ensemble.

Herein, however, is one of the fascinations of the work, for the devotee expresses his personality, his own ideas of the subject he is depicting. Hence the intense human interest and quality of scenic modelling.

Scenic Models for the Advertiser.—The primary requisites of any good advertising model is that it must attract or compel attention, explain the merits of the article advertised and emphasize its desirable qualities.

There is a widespread appreciation of the value of scenic models as silent salesmen. Examples include such diverse productions as a model of a ship's cabin to illustrate its comfortable appointments; a portion of a railway system such as those employed at big exhibitions by the leading railway companies; or graphic displays that occupy the whole of a large window.

Immobile models in metal or plaster, representing famous advertising characters such as those in Fig. 1, are both fascinating and attractive; have the merit of relatively low cost of production, and are often incorporated in a comprehensive scenic display.

Cut-outs and dioramas are comparatively inexpensive, but call for high technical ability, and dioramas in particular can only be successfully constructed when the work is done by a qualified artist or someone with artistic ability.

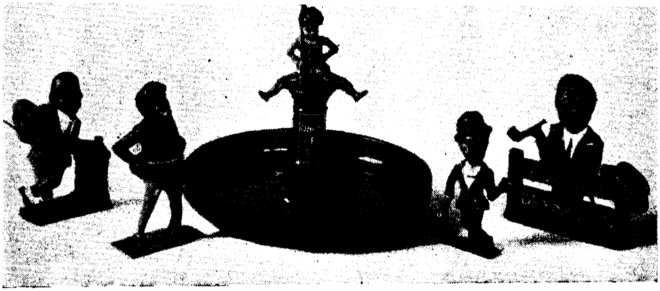

FIG. 1. ADVERTISING FIGURES, BY KEW'S, LTD.

Model of a Street Scene.—A very able piece of combined modelcraft and artistic brushwork is illustrated in Fig. 2, which represents a street scene. It was made by Messrs. Partridge Models, Ltd.; and consists essentially of two elements: in the foreground is a fully modelled street, the side wings representing the buildings on each side of the road where a lorry load of paper is waiting.

The main road in the middle distance and the whole of the buildings and vehicles in the street beyond are painted on a backscene in such a way as to give a wonderful sense of depth, solidity and distance.

Controlled View-point.—The showcase is so constructed that it is only possible to inspect the scene from a limited view-point. This is often a necessity, especially when the effects are based on the perspective lines of a backscene.

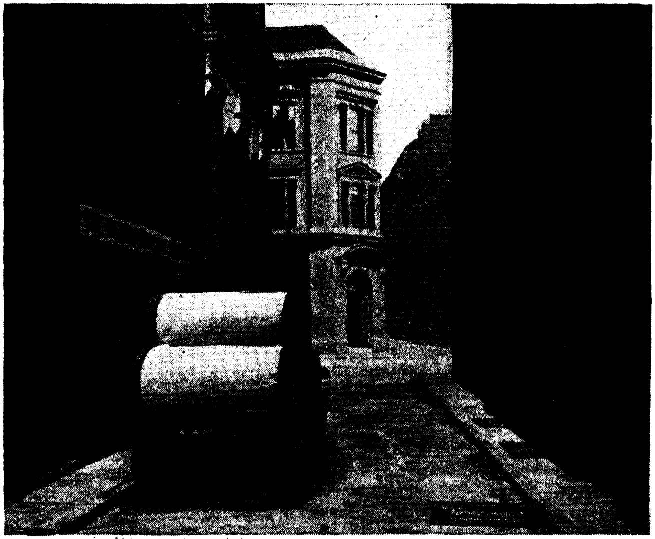

FIG. 2. STREET SCENE, BY PARTRIDGE MODELS, LTD.

The selection and control of a certain view-point is a practical and necessary proposition with many forms of scenic models, particularly those coming under the category of the Diorama.

Large Open Scenic Models.—Quite different in type, purpose and construction are the large "open" models of estates, groups of factory buildings and so forth.

There are many models of this kind, one is shown in Fig. 3, and others are illustrated in later pages of this book.

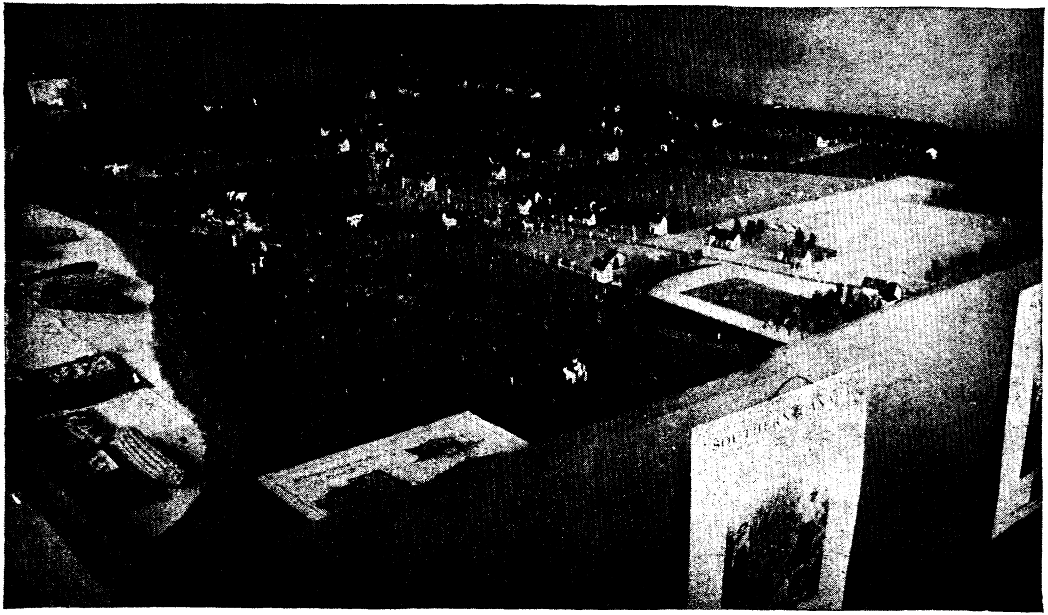

FIG. 3. DOMINIONS SETTLEMENT MODEL, BY E. W. NORTHCOTE.

The model reproduced represents a portion of a Dominion settlement in Canada; it depicts the neat efficient homes of the settlers, shows graphically how the land is divided, the well-timbered surroundings and rich cultivable soil.

Obviously such a model gives a much better impression of the actual place than is possible by means of photographs or drawings. In a sense it portrays the scene as it would appear to anyone passing by in a car or railway train.

Similarly, if the model is placed against the wall, it then represents the scene as it appears to an airman.

The Aerial View.—Open scenic models of the general type under consideration can be viewed from above, just as they would appear to an aerial traveller.

The development of this mode of transport suggests that there will be a growing market for models of this kind, partly as aids in teaching pilots to recognize certain landmarks, to acquire a sense of direction and the peculiarities of vision from high altitudes.

History and the Scenic Model.—Scenic models of all classes have great possibilities for the historian. By their nature they gloss over details which might be awkward to represent in every minute particular, without loss of fidelity and character.

Models of old buildings, castles, cathedrals, the earthworks of the ancient Britons, monoliths, vestiges of civilizations long since passed away—all these, and a hundred and one others, are fitting subjects for the scenic modeller.

Scenic Model of Old London.—Some of the world's most remarkable historical models are to be seen in the London Museum. One example is illustrated by Fig. 4, which shows part of a large model of Old London in A.D. 1550 as constructed by Mr. John B. Thorp.

Mr. Thorp is justly celebrated for the excellence and prolixity of his historical model-work—particularly those showing London through the ages. He imparts into his work an air of realism that is life-like in the extreme. Every care is taken to consult the available authorities as to the authenticity of the details represented on the models.

Novices who take up this phase of the work are counselled to begin with a simple model—such as Anne Hathaway's cottage, shown in Fig. 14, Chapter II. or the Old Curiosity Shop, Fig. 48, Chapter VI.

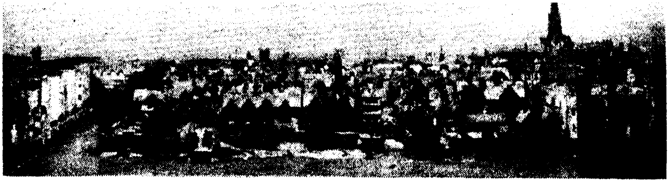

FIG. 4. OLD LONDON, ABOUT A.D. 1550, BY JOHN B. THORP.

Scenic Models for Window Display.—Commercial firms have realized the importance of "scenic models" as a means of attracting the attention of the public to their display windows.

By courtesy of the various firms mentioned a few of these display models are illustrated in this book. One very effective ensemble, which is shown in Fig. 5, is an advertisement for the well-known "His Master's Voice" records of the "Carnival" music.

The two figures on the left represent characters in the story and are set against a background reminiscent of Old Seville. To the right a modelled flight of stairs masks a concealed light which illumines a beautiful painted backscene redolent of the joyous spirit of Carnival.

The display cards announcing the records are comparatively insignificant in size, but are so placed that the eye cannot fail to be arrested by them.

The scene as a whole tunes the mind to the spirit of the records and makes it almost impossible to refrain from their purchase. Such is the compelling power of a good model.

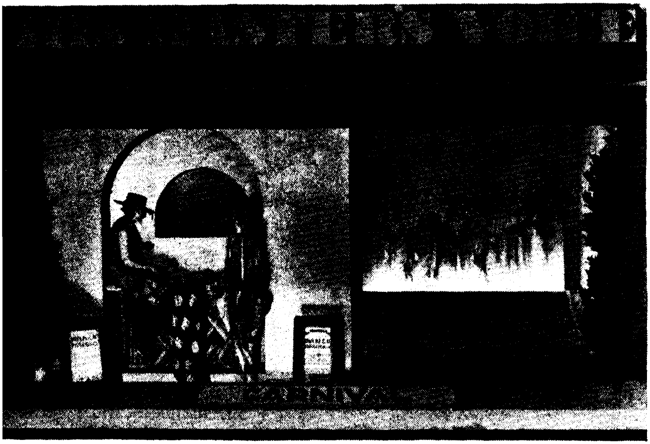

FIG. 5. DISPLAY MODEL OF "CARNIVAL," BY THE GRAMOPHONE CO., LTD.

Fantasies of Scenic Modelling.—Not less effective but quite different in style and thought is the beautiful window display illustrated in Fig. 6. This shows a Christmas scene by Messrs. Selfridge, Ltd., of Oxford Street, London—which combines the merits of true artistry with the strictly utilitarian purposes of salesmanship.

The central figure is a large illuminated but guttering candle, typifying the passing of the old year. The globules of wax running down the candle turn into the joyous forms of children and young animals, symbolic of the New Year; the whole being grouped on an immense candlestick.

The backscene is treated in soft tones of colour in the modern style, and represents the immensity of space,

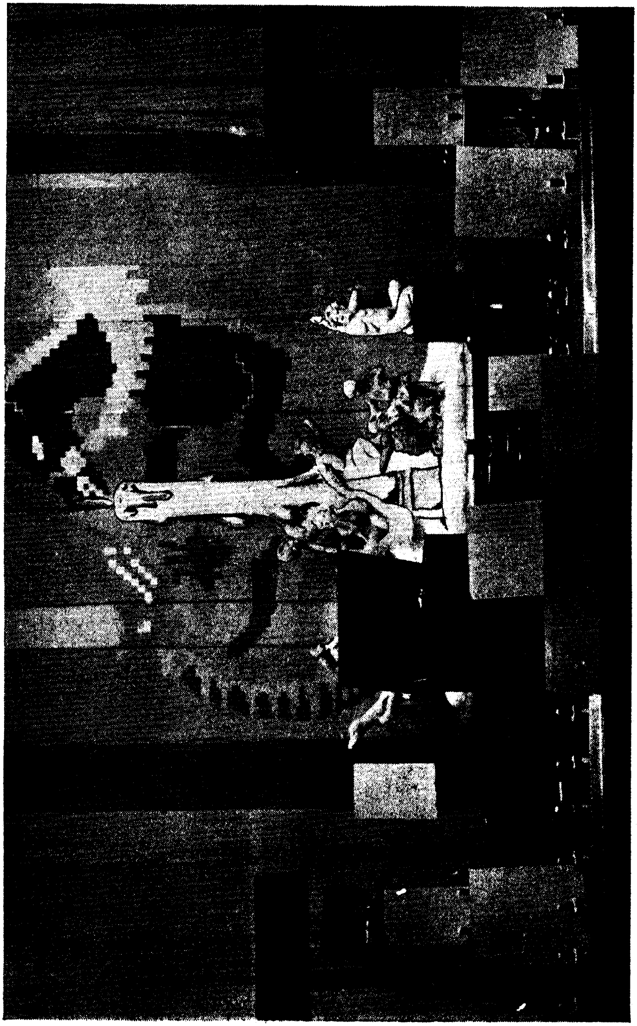

FIG. 6. CHRISTMAS, 1928, BY MESSRS. SELFRIDGE, LTD.

now used by the marvels of modern science as a means of transmitting messages of goodwill to all parts of the world, by the agency of modern radio.

A few well-chosen specimens of wireless sets, valves and accessories, with a few simple direct announcements of the services rendered by the firm, complete a meritorious scenic display.

Royal Ascot.—Messrs. Harrods, Ltd., of Knightsbridge, London, produced an attractive scenic window display depicting Ascot fashions in 1925.

This window is illustrated in Fig. 7, and shows an entirely different conception of scenic modelling to any of the foregoing examples.

Life-size wax figures are thoughtfully placed to show a variety of delightful modes, some on the green of the lawn, others on the warm red tiling of the stable, where the favourite is seen in ideal surroundings.

Everything is life-size, arranged in a simple, direct manner and well illuminated; the window tells its own story in a straightforward manner, leaves nothing to the imagination, and concentrates attention upon the gowns.

Character in Scenic Modelling.—The basis of all good scenic modelling is character—and this is only good when the purpose of the model is fulfilled.

In the examples illustrated, the comedy figures stimulate a smile and call to mind some recently created characters in the advertising world.

The street scene suggests the roar of printing machinery and the insatiable demands of the giant presses. The presses are neither seen nor heard, but the quality of busy-ness is amply suggested to the mind.

The spirit of adventure and the hope of adequate reward for intelligent labour are suggested by the model Canadian settlement.

Reminiscences of a past age, with its clanking men-at-arms and honest burgesses in homespun, come to mind while dreaming over the models of an historic past.

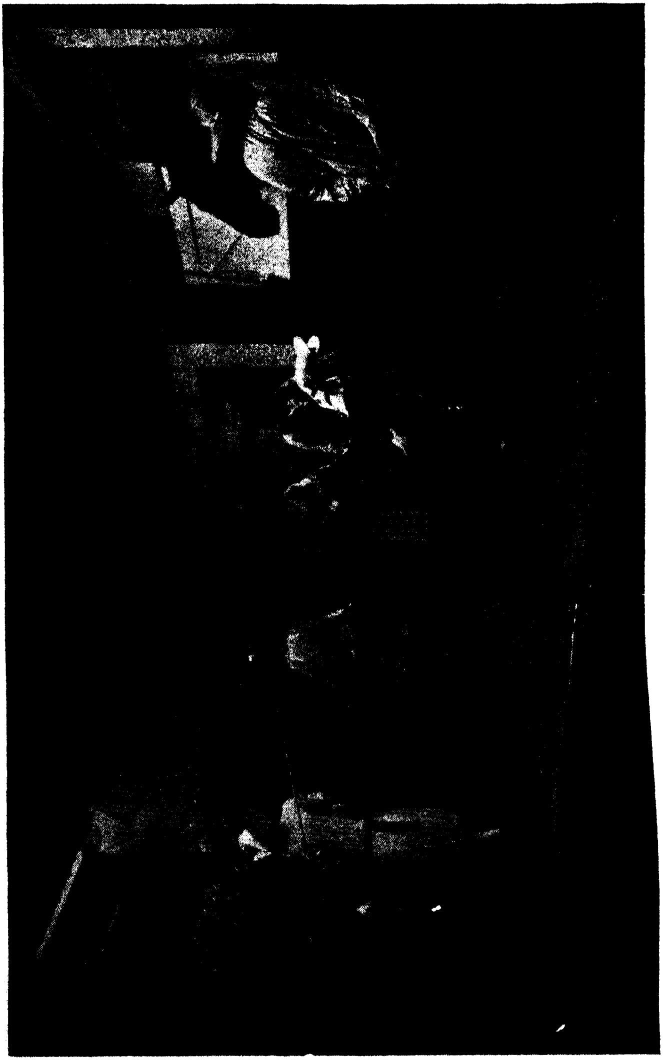

FIG. 7. ROYAL ASCOT, 1925, BY MESSRS. HARRODS, LTD.

The seduction of the dance is suggested in the "Carnival" model, while the potentialities of to-day, with all the kindliness and imagery of Christmas, is the *motif* of the Selfridge window.

Realizing the Unseen.—In all of these models a quality or property—an indefinable something—is realized by the mind of the beholder; it is something unseen but real, intangible but comprehensible.

This quality of the good scenic model should be the great aim of every craftsman—of all who take up model work, either for amusement, as a hobby, or for commercial purposes.

It is the aim of this book to assist to a realization of such an ambition, by simple explanations—in non-technical language—of the various processes involved.

CHAPTER II

Materials, Tools and Constructional Notes

SCENIC modelling is unlike most other constructional occupations in that it is performed in many different ways and with widely divergent materials.

To give a complete list of all the materials and tools that are—or can be—used would require the whole of the space in this book.

On the other hand, a great deal of scenic modelling can be done very effectively with simple materials and homely implements.

Materials for Scenic Models.—The majority of scenic models are as a rule built up with wood or upon a timber base, and for this purpose the ordinary commercial sizes and grades of timber are adequate for most purposes.

There are many kinds of battens or narrow boards, strips, laths, door-step, and beadings that are very valuable for the skeleton framework.

Varieties of Timber.—For baseboards such as that in Fig. 8 the use of tongued and grooved floorboards and the thicker kinds of three-ply wood are recommended.

Thinner grades of plywood have many applications for backscenes and the building up of curved surfaces. The numerous stock mouldings, turned parts including knobs, legs, and feet and machined parts such as appliqué ornaments, are helpful when building up the case.

Strawboards and Cardboard.—A great deal of the work can be done with the various kinds of strawboard—or brown card—which is suitable for rough work. White card is preferable when the surfaces are to be finished by water-colour paint, and for the finer work of architectural modelling the use of a Bristol board is indispensable.

Self-coloured card is invaluable for backgrounds, large cut-outs and other display modelling.

Clays and Plasters.—The various modelling clays, plasticine, play-wax and other plastic preparations can be used on occasion, but are most useful for roughly modelling a figure or building, or other part of an ensemble, as a kind of trial. The clay model will have to be replaced by a properly constructed part after the form and dimensions have been tested in this preliminary manner.

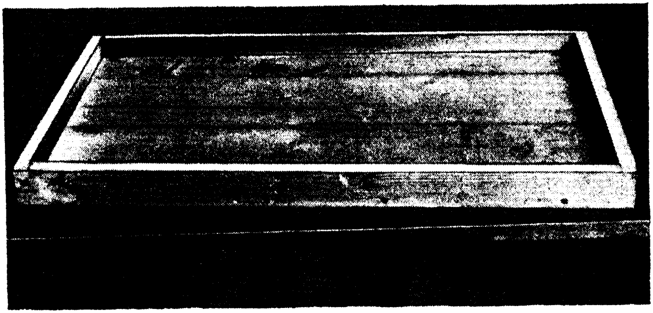

FIG. 8. BASEBOARD FOR AN OPEN MODEL.

Plaster-of-paris is a very valuable material for scenic modelling, both in the preparation of models and as a modelling material; its use and mode of treatment is described in connexion with specific models in later pages of this book, particularly in Chapter VIII.

Thin Sheet Metals.—Some parts of a model can be carried out advantageously with very thin sheet pewter, or copper, especially in the representation of panels or other pieces modelled in low relief.

Strip metal of various cross-sections, wires of different kinds, and embossed metal strips are very useful, while for the representation of constructional steelwork a thin, narrow, rectangular brass strip—known as " pendulum brass "—is helpful and a great time and labour saver.

Angle, Tee, and Channel sectioned brass or steel is available commercially in small sizes, and is suitable for mechanical models and general constructional work.

Wire Gauze in Reinforced Work.—Galvanized iron wire-netting, wire gauze, and woven wire articles of various shapes are extensively used in the preparation of he skeleton framework of plaster models.

For example, a sixpenny wire gauze gravy strainer makes an admirable foundation for a dome to be modelled in plaster. The handle is cut off, the rim of the strainer attached to the top part of the building and the gauze covered with moist plaster-of-paris, and the modelling subsequently completed.

The use of metal gauze in this way as a reinforcing medium saves a lot of time and material.

Coarse sacking—or skrim—is often used for the building up of plaster work in different forms ; it is generally nailed or wired to a skeleton frame of wood.

Fibre, Hair, and Wool.—Egyptian fibre, horsehair, wool, cotton waste, sponge, seaweed, dried and other grasses, and various preparations such as Kapok, can all be turned to good purpose, especially for the representation of vegetable growths.

Cotton and other fabrics, casement cloth and varieties of velvet and many other materials are employed for different purposes, examples being mentioned specifically later on in this book.

Zylonite.—Zylonite, Ebonite, Nacrolac, Erinoid and other manufactured materials are extremely useful for the representation of various surfaces such as those representing tiling, marble and the like.

Celluloid is a useful material in sheet or rod form, but its extreme inflammability renders its use unwise except under appropriate conditions.

Gelatine and Wax.—Gelatine being a transparent substance is useful as a glazing material; it can be moulded or shaped with the greatest ease if softened by gentle heat.

Paraffin wax and other clear and coloured waxes in various forms are indispensable for the fashioning of small parts of all kinds.

Dental Rubber.—When several similar pieces are required, they can frequently be made in plaster moulds filled with dental rubber and gently vulcanized. The normal colour is a deep rich red, but the vulcanized rubber is amenable to treatment with stains and polishes.

Incidentally it can be blended with grey, black, or other coloured rubbers prior to vulcanization and yields some useful mottled or marbled effects.

Nails and Screws.—It is useless attempting to particularize on the subject of nails and screws; all and every kind are useful in turn. For the average woodwork the use of panel pins, cabinet pins and oval brads is recommended.

Clout nails are best for fastening canvas to wood frames, ordinary wire or French nails are employed for the general rough woodwork.

Tools for scenic modelling.—The number and variety of the necessary tools is conditioned almost entirely by the particular nature of the model—but the ordinary hand-saws, planes, chisels and woodworker's kit fill the need for all the carpentry work.

A few carver's tools come in handy sometimes, while a set of clay modeller's or plaster modeller's tools are needed for the work on plastic materials.

Modelling tools are usually shaped pieces of hardwood, some with wire ends, and some with fine points, and they are often prepared by the operator.

A selection of files, a hacksaw, hand-drill, some taps and dies, a good bench vice and the usual selection of amateur metal-worker's tools are needed for the metal-working processes.

Chalk lines, crayons, drawing instruments and a good selection of paint brushes are necessary for the decorative work.

Selection of Tools.—There is no need to buy a lot of tools before commencing a scenic model. A great deal can be accomplished with a pocket-knife and a piece of sandpaper. The best advice is to start the work and to get only those tools which are essential for the proper completion of the work.

GENERAL NOTES ON CONSTRUCTION

The following general hints on construction are applicable to almost every kind of scenic model.

Preparation of contoured surface.—When the surface is curved—or contoured—a series of shaped transverse members are fitted to the base and the surface covered with card as shown in Fig. 9, but it is necessary when

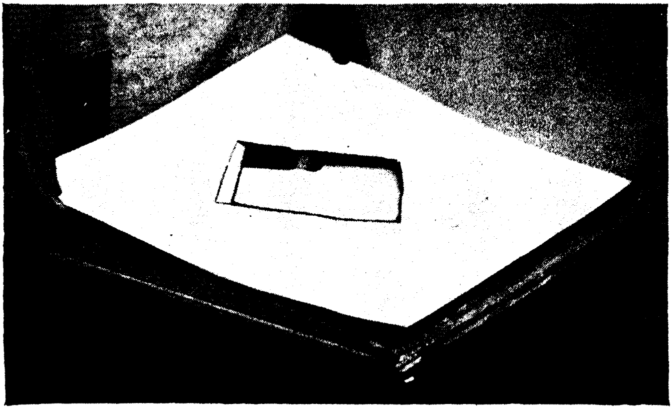

FIG. 9. BUILDING UP THE SURFACE.

a building is to be erected that a level space be provided for it, as building should always be done from a horizontal—or level—plane.

Embankments and Cuttings.—Scenic models in which there are considerable differences in the levels or contours, for example a model railway cutting and tunnel, call for the erection of a skeleton framework of timber which can be covered with canvas or thick sheets of brown paper—somewhat as seen in Fig. 10.

These rough surfaces are subsequently covered with plaster, or otherwise treated in an appropriate manner, as described later.

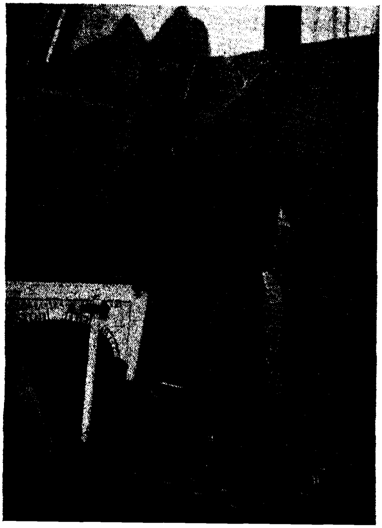

Fig. 10. Preliminary Work on a Cutting and Tunnel.

Paths and Roadways.—The usual treatment for a path or road is to paint the base with adhesive—diluted with a suitable staining colour, and then apply a powder to the moist surface as shown in Fig. 11. Fine sand, emery powder, cement, whiting—previously dyed to the desired tint can all be used in this way.

A flagged path or one laid with crazy paving can be represented by a strip of thin card, scored or indented to represent the joints between the stones, and then coloured in a natural way with artists' colours.

Monotony of tone should be avoided by varying the degrees or shades of colour, and every endeavour made to catch the true character of the weatherworn stones.

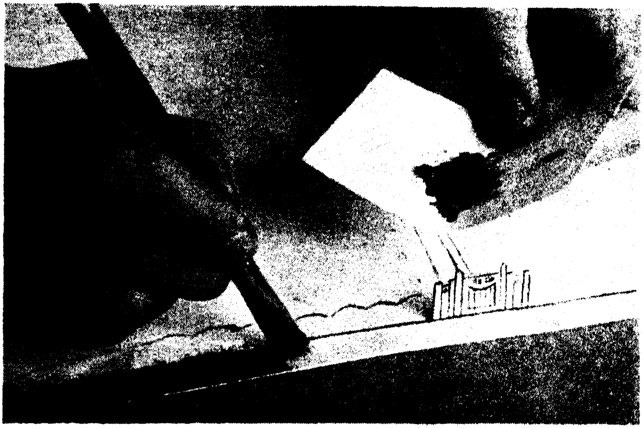

FIG. 11. APPLYING EMERY POWDER TO SURFACE.

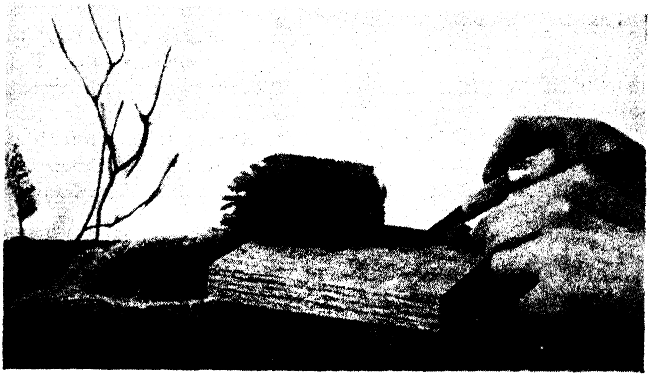

FIG. 12. FIRST STAGES OF TREE-MAKING.

Trees and Shrubs.—Work of an entirely different nature is required when making trees and shrubs.

The usual materials are twigs of appropriate shape for the trunk and boughs, loofah, and sponge for the foliage.

The sponge is " teased " or fluffed up with a knife blade as shown in Fig. 12, this being done by a scraping or "scratching out " motion of the knife.

The prepared material is then dyed and after it has dried is again teased.

Suitable pieces are then applied to the twigs with tweezers as shown in Fig. 13, and secured where necessary with a trace of adhesive.

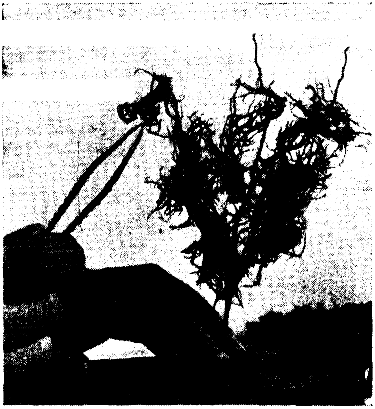

FIG. 13. BUILDING UP THE FOLIAGE

Thatched Roof.—The method of thatching a roof on a scenic model is shown in progress in Fig. 14, which should be almost self-evident.

The roof surface is first prepared with a sheet of coloured card to which the pieces of dried grass are fixed with a clear adhesive ; Photo-mountant is excellent for the purpose.

Floor Coverings.—The representation of carpets, linoleum and other floor coverings on a small scale model is often a difficult matter ; one way is to use cuttings from the coloured lists supplied by many furnishing houses, another is to design a simple pattern and make a wood block or a " lino-cut," and print the carpet, using any appropriate coloured cloth or other suitably textured material.

Cardboard and Paintwork.—Cardboard work is generally a matter of correct planning and cutting; there are two great systems, the " cut and fold " and the " built up "; both are dealt with fully in Chapters VI and VII.

Paintwork is most important and in Chapter IV the matter is dealt with at length.

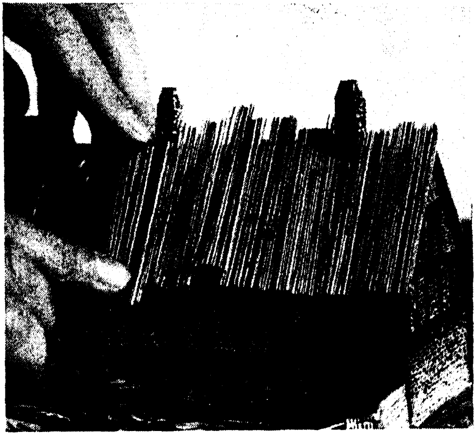

FIG. 14. THATCHING A SMALL ROOF.

Electro-deposition.—A film of metal can be electrically deposited on a plaster or other mould and this method is extremely useful for the reproduction of very small and relatively intricate metal parts; for example, the wheels for a tiny model locomotive. One pattern is first made from which a mould is taken, and the metal is electro-deposited on it, thus producing the desired replica. A somewhat analogous process is followed in the production of small metal parts from an enlarged drawing of the desired object.

There are several photo-mechanical processes by which a drawing or photograph can be reproduced.

The process is invaluable for some small model work; for example, a name plate in relief, small wheels with spokes and so forth. A drawing is prepared to any convenient size, a "line block" made from it of the desired size, and this when cleaned up at the edges is fastened in place on the model.

CHAPTER III

Preparatory Work, Composition and Design

CONSIDERED from the point of view of design, all scenic models can be grouped into one of two categories.

(*a*) Those which are a reproduction in miniature of an existing structure.

(*b*) Those which represent a natural scene, or by their nature rely on the designer's art for their success.

An example may help to explain this important point A straightforward model of a locomotive would be based on the original design to which the engine was built. If, however, the same locomotive is to be represented while hauling a train through a mountain pass, the scenic model will have to be designed as such and the locomotive will be conditioned by the general rules governing the composition of the entire model.

Fundamental Conceptions of Design.—The following notes are appropriate to the design and construction of scenic models of the second category ; which, incidentally, are by far the more numerous and popular.

Appreciation of the principles of composition and design are essential to successful scenic model work. Mathematical accuracy, which is essential in scale model work, is impracticable with a scenic model.

The Attractiveness of Beauty.—T. A. Cook in his book, " The Curves of Life," amply demonstrates that " nothing that is mathematically correct can ever exhibit either the characteristics of life or the attractiveness of beauty."

Now it is precisely these qualities that should predominate in model work—the good scenic model should have the character of the living prototype, allied with every attribute of beauty.

Practical Delineation.—The scenic artist may conceive in his mind the subject and treatment for a delightful model, but the vision has to be translated into tangible form.

The elementary way of doing this is to draw outlines of various objects upon a sheet of paper. Such a drawing indicates the " line " or borders of the objects and must be in correct proportion, cleanly and accurately delineated.

Supposing some wires were bent to the shapes of these lines, and the wires were fastened together, the result would be a crude kind of scenic model.

It would however indicate only one element of design—that known as line—and neither have form nor mass.

The Silhouette.—Supposing the wire outlines were replaced by similarly outlined pieces of cardboard, the result would be a silhouette of the objects, and their " lines " would be depicted by the outer edges of the card.

Progressing further, the cards can be used as surfaces whereon to depict other features which will impart intelligibility and interest.

Technique of Design.—Ability to so treat a flat surface that it shall convey to the mind of an observer a true comprehension of the form and colour of the object itself, is the greatest attribute of the scenic artist.

Technique—or the manipulative methods by which the effects are realized, can only be attained by practice, knowledge and experience.

It is quite impossible to learn by any other method than practice ; to learn to draw necessitates the practice of drawing; to impart " form " requires a knowledge of shading and the arts of colour blending. To produce a pleasing ensemble calls for a comprehension of the principles of " composition."

Within the space in this book it is impossible to do more than indicate in the baldest terms, something of the basic principles underlying all good technique.

Simple Definitions.—By " line " is meant a conscious mark on a surface, the mark being relatively long and narrow. A pencil, ink or paint line.

When the word " line " is used in conjunction with a composition, it means an invisible line connecting points of interest—it is the path which will be followed by the eyes when viewing the picture or the model.

The word " form " means the solid shape of a body; it is also used to describe a painting or drawing which has been suitably treated to simulate the shape of the object.

An " outline " is a line so shaped that it defines the borders of an object.

" Mass " is the word used to describe a grouping together of several forms, and also in the sense of imparting weight or solidity.

Composition.—Composition is the orderly arrangement of lines, masses, and forms, in a complete ensemble.

The purpose of the scenic model will condition the composition by assigning a relative importance to the objects of which it is composed; but it is the province of the artist to arrange those objects in such a way that they tell their own story in the most agreeable manner.

Experience and observation confirm the statement that certain well-known outlines convey characteristic impressions to the mind.

Horizontal lines suggest repose, restfulness, placidity. Vertical lines suggest height, dignity and support. Wavy lines imply uncertainty and turbulence.

A curved line can do more than a simple straight one, because it may impart a sense of form when it becomes two-dimensional.

Combined Lines.—Curved lines and combinations of straight lines can impart a variety of other properties to the object depicted and may imply the possession by the object of a definite quality.

For example, an equilateral triangle upon a horizontal base conveys a sense of stability and security, hence it is most appropriate as the symbol of the "safety first" campaign.

If the triangle is depicted standing upon its apex it appears to be unstable and possessed of an inclination to topple over.

Curved Lines in Composition.—Curved lines suggest a state of motion, varying in degree according to the rate of change of curvature.

The kind of motion is implied by the nature of the curves—long, easy curves suggest slow, gentle movements. Short curves of variable form impart a sense of rapid, turbulent motion. Regularly disposed curves suggest rhythmic movements.

Further consideration of the subject of composition demands a comprehension of the fact that the basic lines are seldom apparent as such, but are invisible lines, or eye-paths from point to point.

Points of Interest.—The lines of the composition are to a large extent governed by the position of the point of greatest interest, which may be an actual object, or an emphasized area, or a sudden change of colour.

If the point of interest is dominant, the eye will commence its journey from it, and the effect of the composition will be dramatic in its suddenness.

Lines of Approach.—Most compositions for scenic models, however, commence from a base, and by the judicious arrangement of points of graded interest, the eye is guided along definite lines of approach to the principal object.

Technical excellence in a composition may give satisfaction to the beholder, but in practical work, especially for display models, the lines of the composition should lead from point to point and compel the observer to realize in full the significance of the message it is desired to convey.

Comparative Examples.—The principles of direct straight-line composition are amply and ably demonstrated in the "Tea for Two" display model—illustrated in Fig. 15, by courtesy of The Gramophone Co., Ltd.

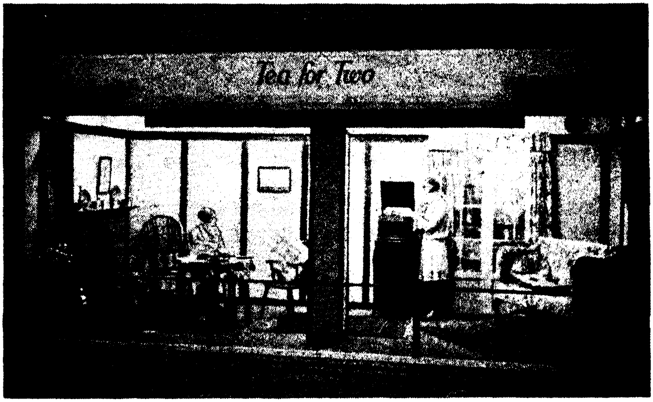

Fig. 15. "Tea for Two," a Display Model, by The Gramophone Co., Ltd.

The background is a restful pattern of horizontal and vertical lines which prevent the eyes from straying beyond the borders of the scene. The three fully-modelled, life-size figures are so positioned and grouped that the eye, seeing the dog, is induced to travel towards the lady seated at the tea table, and following the direction indicated by the poise of her head, reach the point of chief interest—the gramophone—and the attendant figure.

Analytical Diagrams.—The dog was chosen as the starting-point for analysis, because it is further strengthened by the interest of the flowers, chest and warming-pan.

Similarly, the placing of the settee on the right compels the eye to travel along the line of the seat back and so again reach the point of greatest interest.

These invisible lines are manifested in the analytical diagram, Fig. 16, which clearly shows the stability of the whole composition, while the breadth of the base suggests restfulness and the placidity of the theme.

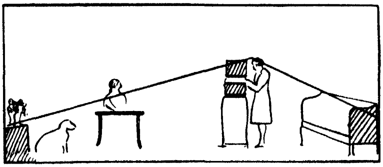

Fig. 16. Composition Lines of "Tea for Two."

"Tea for two" is a particularly happy piece of work because it overcomes the structural difficulty introduced by the central column.

The master hand is revealed by the simplicity of its treatment—had a showcard or lettering been added, the composition would have been ruined and the post would have become the dominant feature.

Scenic Window Display.—The "Easter-tide" window

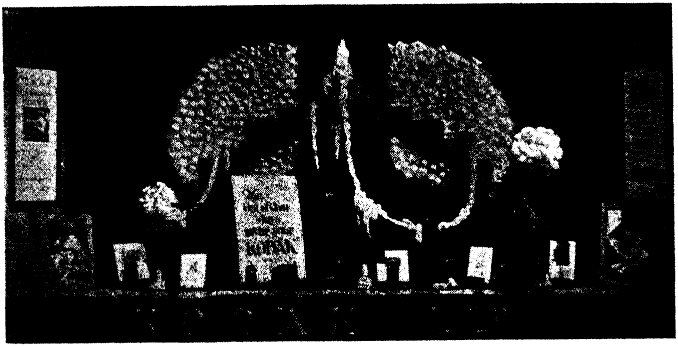

Fig. 17. Window Display by Messrs. Kodak, Ltd.

display, Fig. 17, by Messrs. Kodak, Ltd., strikes an altogether different note ; the model work is limited to a few golden vases, a golden bridge and some futuristic foliage.

Interest is arrested by the dominating masses grouped symmetrically behind the bridge, and the eyes are compelled to travel downwards to the cameras grouped at and near the base.

Another display by the same firm, shown in Fig. 18, has a simple semicircular background, with a suggestion of a house, and in front are cut-outs symbolizing the spool-holders of Ciné cameras. The composition is simple and stable, and the lines lead directly to and from the base where the cameras and projectors are displayed.

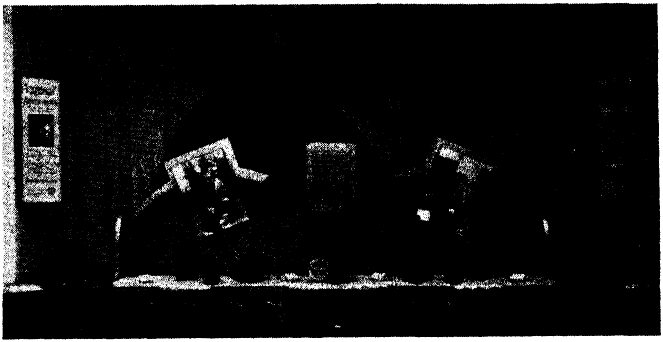

FIG. 18. ANOTHER COMPOSITION BY MESSRS. KODAK, LTD.

Determining the Best Treatment.—When a composition has been settled in the mind and expressed in a preliminary sketch, the mode of treatment claims careful attention.

The use of decorative backscenes and simple cut-outs are obviously appropriate in the last two examples.

When the nature of the subject is such that considerable distances have to be represented, a combination of backscene, cut-out and fully modelled parts is helpful, and this usually develops into a diorama on the lines of those fully described in Chapter V.

It is possible to make a very successful scenic model, especially those of comparatively small size—say 2 feet wide, and 15 inches high—with only a backscene and a few simple cut-outs.

An example of this kind is given in Fig. 19, representing a lonely suitor serenading his sleeping lady.

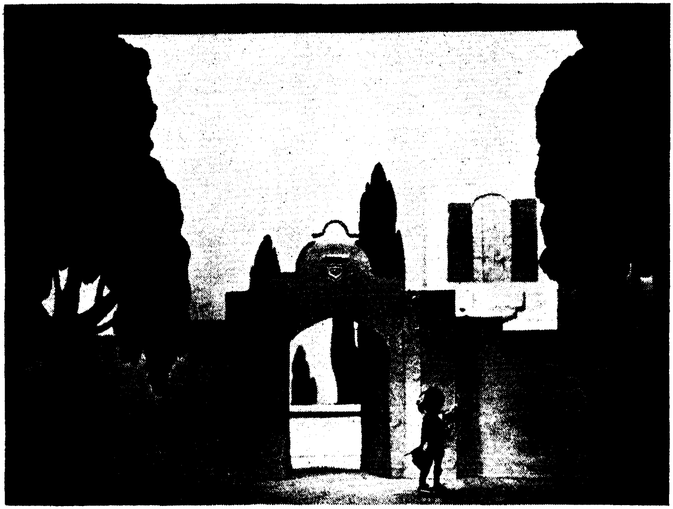

Fig. 19. "The Serenader," by H. W. Whanslow.

Theatrical Effects.—The backscene has simple representations of cypress trees; in front and to the right is a "cut and fold" model of a part of the house. In the middle distance is a cut out and partly modelled wall and entrance gateway. The wings are occupied by heavy masses of foliage and are largely necessitated by theatrical considerations. The serenader is a well-modelled figure suitably clothed and adorned.

Interest is centred on the figure, whose pose directs the eyes to the closed window, where the wide-open shutters suggest that the fair inmate will shortly open the window in gracious response to the solicitations of the singer.

Practical Work.—After the style of the model and its treatment have been settled, a design should be prepared to any suitable scale. It need not be very elaborate, provided it clearly indicates the portions of the backscene, those for the cut-outs and others to be fully modelled. An elevation, plan and end view are usually sufficient.

Enlarging the Design.—These various elements of the design have now to be enlarged and transferred to the full-size parts. One method is to rule a series of equidistant lines, forming squares all over the design, and then to draw similar lines, but wider apart on the drawing paper, the ratio between the sizes of the squares being equivalent to the number of times the design is to be enlarged.

For instance, if the model is to be four times as large as the design, the squares on the latter should be, say, ½ in., and those on the full-size sheets should be four times the size, that is, 2 ins. wide.

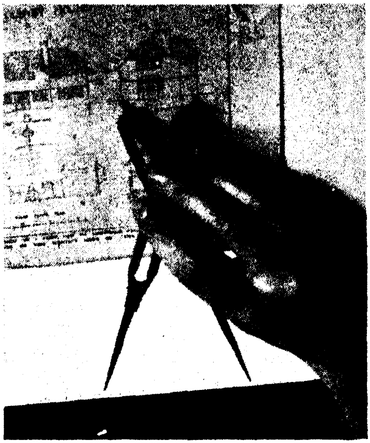

FIG. 20. PROPORTIONAL COMPASSES IN USE.

Proportional Compasses. — Instead of adopting the "squares" method, a pair of proportional compasses as in Fig. 20 could be used. They are suitably adjusted and the "short" pair of legs applied to the design, and the correspondingly increased distance between the "long" pair of legs transferred directly to the full-size drawing.

Curves are sometimes difficult to transfer and to draw cleanly, especially when dealing with parts of a ship model. In such cases the use of "ships'" curves, as shown in Fig. 21, will be found a distinct aid. The lines are drawn in pencil, or with a "ruling pen"—as shown in the illustration—when an ink line is required.

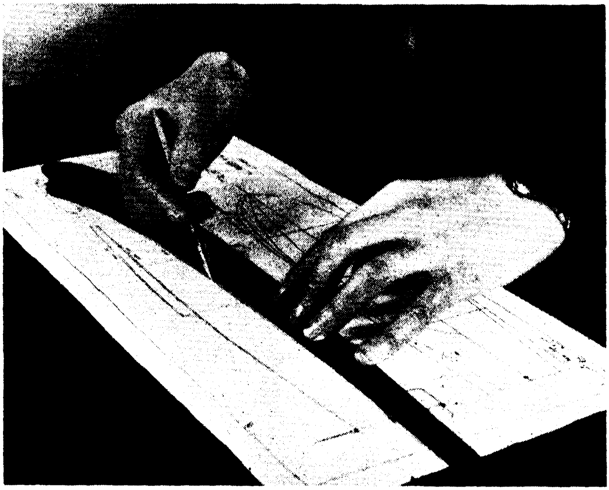

FIG. 21. DRAUGHTSMAN'S CURVES IN USE.

Draughtsmanship.—The essential instruments for the preparation of drawings and the like for scenic models are a good drawing-board at least "Imperial" size, a Tee-square, one or two set-squares, pencils, pens, india-rubber, compasses with pen and pencil points, and a pair of dividers.

A knowledge of the proper use of these and other instruments and some ability to prepare simple drawings are assumed. Readers who desire aid in this direction should obtain one of the excellent handbooks now on the market.

CHAPTER IV

Scenic Painting, Cut-outs and Flats

MUCH of the work of scenic modelling is associated with the application of paints and the discriminating use of colour, a matter conveniently termed scenic painting.

There are a number of pigments that can be used, but the novice is recommended to adopt the ready prepared materials now on the market.

Paints and Colours.—Artists' water-colours are very good for use on good white paper or card, but they are rather transparent and lacking in covering power; but this can be increased by the addition of flake white or Chinese white.

A delightful range of colours are now prepared under the general title of Poster-colours.

These have plenty of body and good covering power, and can be used over wood, plaster and other substances.

Distemper and Wall-paint.—There are numerous kinds of distempers and wall-paints that can be employed, especially for the covering of large areas; they have the merits of good covering power, economy and ease of application.

Practically all the foregoing are soluble in water, and all are normally applied with a good-sized brush. A 2-inch distemper brush is generally serviceable for large work.

Flat Oil-Colours.—Most of the paint-makers now supply oil-colours that dry rapidly without gloss, and are then known as "flat" colours.

The finest grades are known as "coach" colour "ground in oil," but there are many admirable and high-quality brands on the market.

For small work the artists' oil-colours are frequently used, but they take a good while to dry unless mixed with "patent driers."

The regulation "flat" colours as a rule show brush strokes less and are generally to be preferred.

Enamels and Varnishes.—Glossy enamel is often helpful when a deep, rich, lustrous colour is wanted, or may be used to impart relief, or to simulate a glazed surface.

Varnish may be used when necessary as a protective covering; a coat of crystal or spirit varnish over poster-colours will enhance their richness and depth and act as a preservative. Finger-marks on flat colours are difficult to obliterate, but on a varnished surface can be removed with a damp cloth.

Brushes.—Brushes must be selected to suit the size of the areas to be painted, and the pigment to be applied. In general, a suitable selection would include several sable hair brushes for small work, one or two large sizes for broad washes of water-colour and a few for use with varnish and distemper.

Always use good quality brushes, and keep them scrupulously clean and free from dust.

Those used for water-colours, poster-colours or distempers can be cleaned in warm water, those used for oil-colours are cleaned with turpentine, while those for spirit stains and colours are cleaned with methylated spirit.

Brushes used with the modern cellulose colours can generally be cleaned with Acetone.

Air-Brush Work.—The possession of an air-brush enables a great deal of work to be done easily and rapidly, especially in the shading of large backscenes and work of that kind.

Many delightful effects are, in fact, only practicable by the skilful use of the air-brush. The instrument is somewhat costly for the amateur or jobber, but is indispensable for the serious worker.

Practical Scene Painting.—Scene painting is an art in itself, and a clever exponent can realize stage effects that are wonderful when viewed from the front. Much of the illusion is lost by a too close inspection of the work, for it then appears to be largely a daub of gaudy colours.

With scenery for a model stage such as that in Fig. 22, the conditions are quite different. The spectators are comparatively near the scene, and the scene painter has a troublesome task.

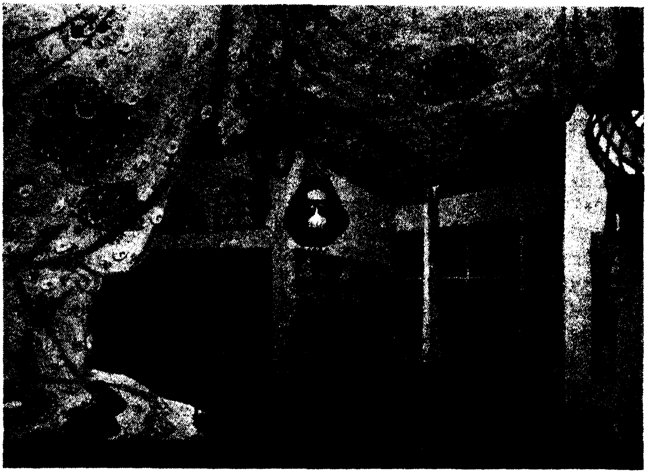

FIG. 22. SCENIC PAINTING, BY THE MODEL THEATRE GUILD.

No longer can the work be in daubs and blobs; it must be executed with almost photographic accuracy.

In a scenic model the view-point is controlled and the scenic effects can be handled accordingly. Nothing much can be usefully said about the operative side of miniature scene painting, and it is only possible to recommend the novice to study a few elementary works on composition, drawing and design.

First Attempts at Scenic Painting.—Make a start by using ordinary distemper, poster colours or water-colours mixed with flake white when working on cardboard or paper.

For small models, however, the novice is well advised to adhere to a " Water-colour Board " for his backing, and to treat it in exactly the same way as a water-colour painting, but using stronger colours with plenty of body, and not fearing to give dramatic strength and vigour to the work.

Light and Shade.—Form is imparted to a flat surface by suitable gradations of colour, or by shading. Observation will soon show that the light generally falls in a certain direction, brightly illuminating the parts near the light, and casting a shadow on the surfaces remote from the light.

Unfortunately, scenic artistry cannot be acquired from written instructions; it can only be learned by observation and work. A study of the various models illustrating this book will show what can be done and will point the way to success.

Study of good handbooks on water-colour and oil-colour painting will help those who are dubious of their own ability, but the author personally advises getting a box of colours and painting scene after scene until dexterity and ability are acquired.

The Use of Cut-outs.—The term cut-out is applied in a general sense to all flat surfaces cut to a definite outline and suitably treated to simulate some definite feature of the composition.

An example of large-size cut-out figures in the super-modern style is illustrated in Fig. 23, which shows a scenic window display by Selfridge, Ltd. The figures are built up of several laminations of wood and are painted in dull colours relieved with gold and silver.

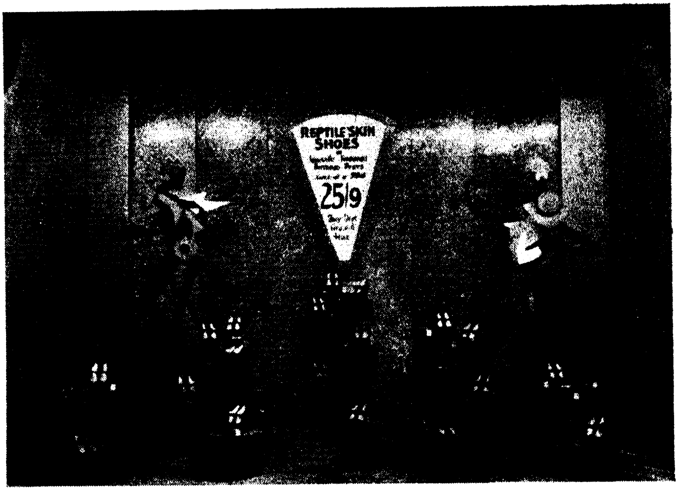

Fig. 23. Modern Cut-Outs, by Messrs. Selfridge, Ltd.

Life-size Cut-outs.—Another example of cut-out work is shown in Fig. 24 as carried out for a scenic window display by the Kodak Company.

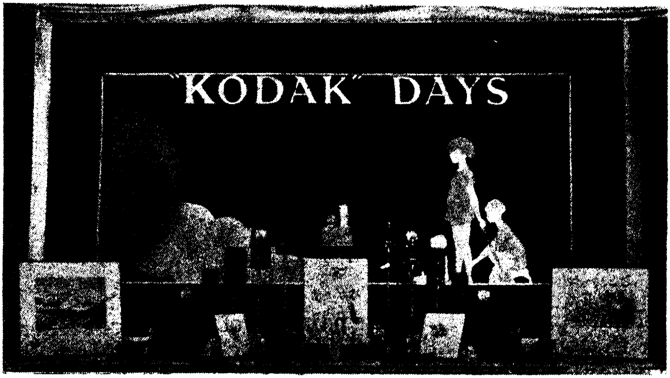

Fig. 24. Scenic Effects, by Messrs. Kodak, Ltd.

The composition is somewhat involved, and really consists of two superimposed designs.

The Yeomen of the Guard model shown in Fig. 25, by the Gramophone Co., Ltd., is a portrayal of well-known characters in this delightful music play. The composition of the scene is weak, as the separated figures compete for pride of place.

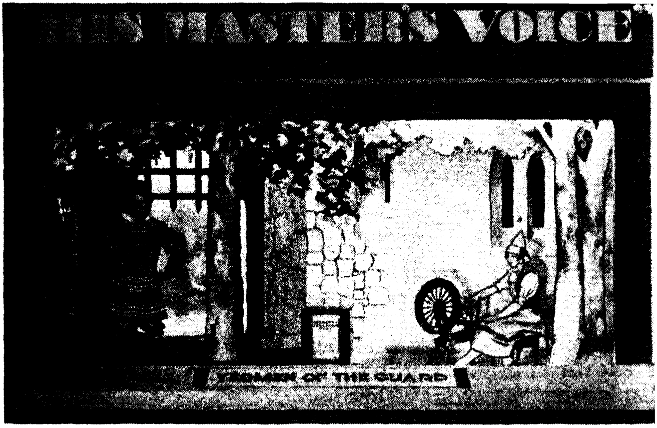

FIG. 25. "YEOMEN OF THE GUARD," SCENIC MODEL, BY THE GRAMOPHONE CO., LTD.

Disjointed composition and restless comparison of colour are blemishes on an otherwise attractive scheme shown in Fig. 26, by the Kodak Company. The popular figure of the Kodak girl is overwhelmed by the heaviness of the groynes in the background, while the seascape shown on the panel is quite unnecessary—a suggestion of the sea behind the groynes would have been far more effective.

Miniature Scenery.—The painting of miniature scenery for theatre and scenic models is practically the same as painting a picture, except that the treatment can be on broader lines.

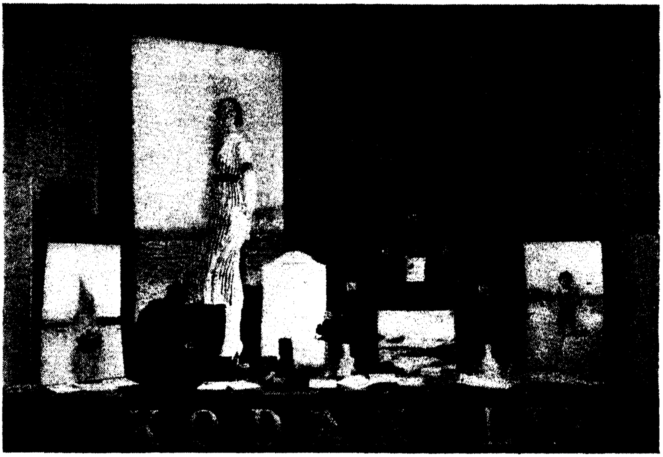

FIG. 26. "SEASIDE AND A KODAK."

The "Immortal Hour" shown in Fig. 27, painted by Lucien Myers, is a first-rate example of what can be done in this direction. The general crudity of the scene is in keeping with the theme and the period of the play.

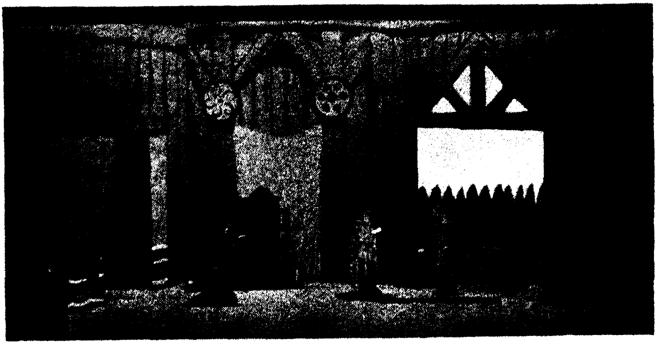

FIG. 27. MODEL OF A SCENE FROM THE "IMMORTAL HOUR."

Making Cut-outs.—Cut-outs for scenic models are usually made from stout water-colour board or Bristol board. The procedure is to outline the shape in pencil, then to cut the card to the lines.

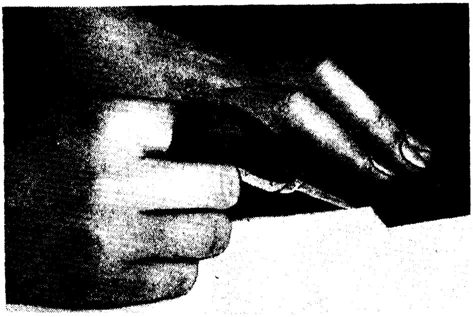

FIG. 28. HOW TO MANIPULATE THE CUTTING KNIFE.

A sharp pocket-knife or a regulation mount-cutter's knife are the best implements to use.

When making straight cuts always guide the blade with a wooden or steel straight-edge as shown in Fig. 28.

To ensure a clean cut, lay the card upon a sheet of strawboard, or plate glass, and press sufficiently heavily on the knife-blade to sever the card with a single cut.

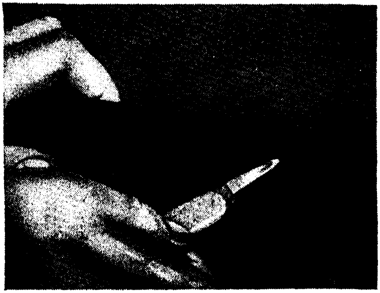

FIG. 29. SHARPENING THE KNIFE.

Sharpening the Cutting Knife.—The knife-blade must be kept extremely sharp, and this should be done by rubbing it lightly on a finely-grained oilstone, as shown in Fig. 29.

Curves can be cut with a knife if a sufficiently accurate movement is made with the arm and wrist, or by the use of the ships' curves shown in Fig. 21, otherwise the work can be done with good sharp scissors.

Marking Out and Painting.—The chief features of—or on—the cut-out should be lightly indicated with soft blacklead pencil or with French charcoal. The painting then follows, and it is generally best to wash in all the large areas first and then to work up the finer details. Be careful to keep the colours on the light side, as it is always easy to darken them if necessary ; there is a loss of brilliance if the tones are too dark.

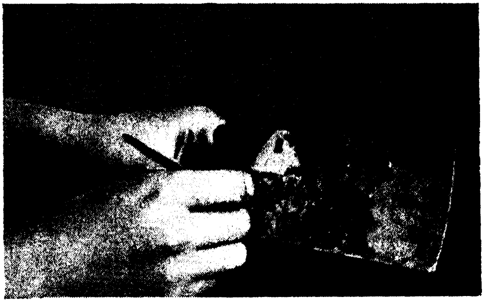

FIG. 30. PAINTING A CUT-OUT.

The author prefers to " get the effect " by washing over all parts and broadly indicating the features as in Fig. 30. This enables the ensemble as a whole to be viewed and judged and any corrections made accordingly.

Aerial Perspective.—Remember to make the colours and the shadows soft and misty in the distant parts, stronger and bolder in the foreground to enhance the sense of distance, or give " aerial perspective." Remember also to keep all high lights and shadows in proper relation. For example, when a sunset sky forms the background, the visible features on the West should be in darker and stronger colours, as if they were screened from the red glow of the setting sun, whereas the objects to the East would be more tinged with the reflected reds.

Making a Simple Scenic Model.—By way of example, the work on a rural scene will be briefly described. The general composition and theme are shown in Fig. 31, while Fig. 32 gives the outlines of the various cut-outs, flats and backscene.

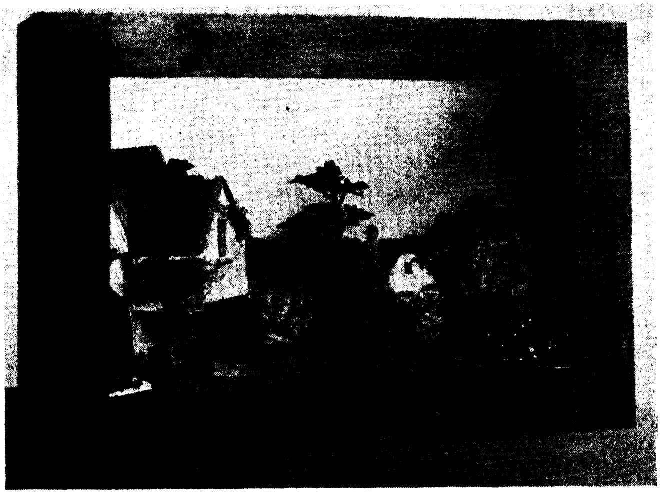

FIG. 31. RURAL SCENE IN CASE.

The case has a semi-circular back, as shown in the plan and further detailed in Chapter XV.

The Backscene.—The backscene, A, is a sheet of Whatman or other good-grade drawing paper, the upper part washed in with cobalt blue and cloud forms indicated by wiping off the blue, while it is still wet, with a piece of clean rag dipped in water.

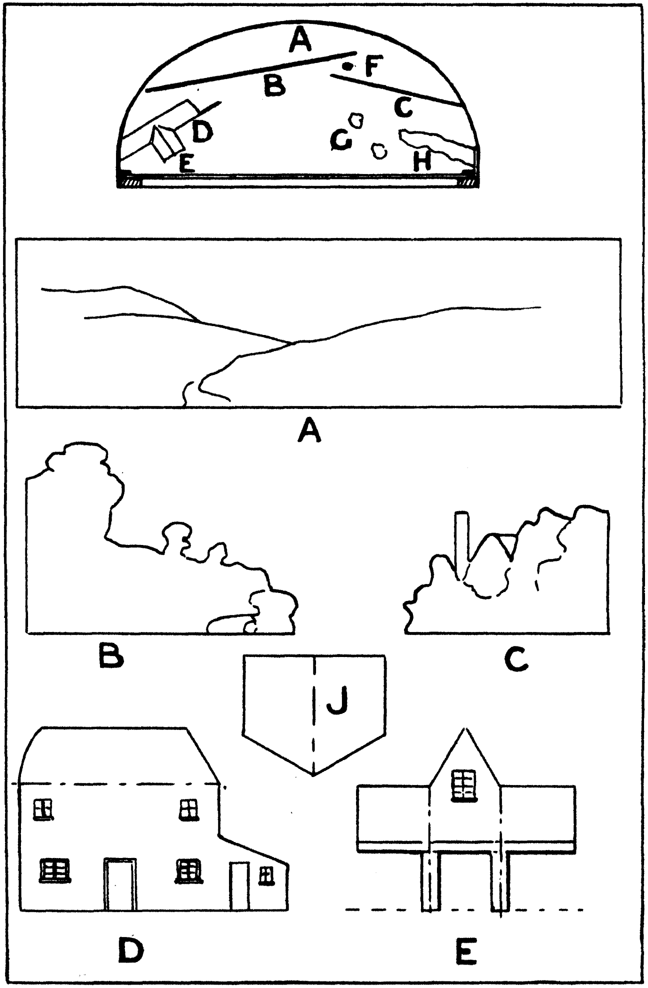

FIG. 32. PARTS FOR THE RURAL SCENE.

The distant hills are then washed in with bluey-purple and shaded slightly while the colour is still wet. A hard profile and soft forms are desired at this stage.

Two cut-outs, sometimes called flats, are shown at *B* and *C*, and should be painted in moderately strong colours. They are subsequently fixed in place with blocks of wood glued to the back edges and to the base.

The Skeleton House.—The building on the left is a shell or skeleton built of three parts, *D*, *E* and *J*. The first makes the main wall, and is bent over along the dotted line to form the roof. The second part, *E*, makes the gable end and projecting part, and is covered by the roof-card *J*.

All these parts are cut out, painted and then glued together. They are then put in place and secured by blocks of wood at the back; any additional paintwork is then applied to them.

The tree at *F* may be a cut-out or modelled in low relief; the bushes at *G* and hedge at *H* are fully modelled.

Completing the Scenic Model.—The work is completed by sanding the roadway, making up the crazy paving at the entrance and generally adding the finishing touches in the form of little bits of dyed wool to represent the clematis at the entrance and so forth.

The modelled parts must be neatly blended into the backscene and cut-outs, particularly the roadway near the centre, which ought to appear as if winding away out of sight down the hill.

Blending Modelled Work into Background.—The covering up of the dividing lines between the flat surfaces and the modelled work is most important; the general idea is to mask the joint by pieces of twig, moss, little bits of stones and so on, according to the nature of the model.

Finally, a few touches of bold heavy colour are given to the painted surfaces with a view to matching the colours, tones, and especially to simulate and enhance the shadows.

Emphasizing the Shadows.—Parts that are slightly modelled can be emphasized by enhancing the shadows, either by strengthening the depth of tone of the real shadow or by simulating others.

An example of this is shown in Fig. 33, which represents the gable end of a small house where the natural shadows have been emphasized in this way and a great deal of modelling introduced by paint-work alone.

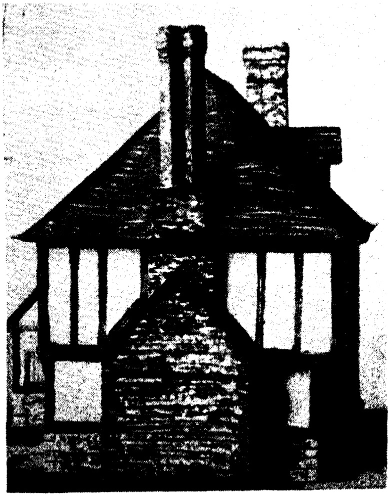

FIG. 33. TREATMENT OF A TUDOR CHIMNEY.

The only modelled parts are the chimney above the roof-line and the lower part with the triangular top; all the rest is flat, and the effects are obtained by shadow painting.

CHAPTER V

Making a Diorama

A DIORAMA is virtually a picture in semi-relief, although it embodies some fully modelled features. At public exhibitions the diorama is generally enclosed in a handsome polished wooden case, with a glazed opening, the

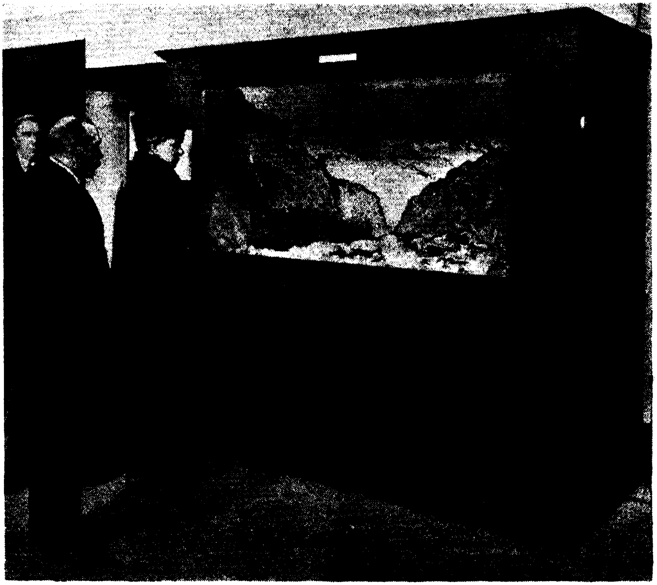

FIG. 34. THEIR MAJESTIES THE KING AND QUEEN INSPECTING A DIORAMA AT THE IMPERIAL INSTITUTE, LONDON.

model proper being built up in the space behind this window.

Royal Interest in Scenic Models.—Some very fine examples of scenic model-work are on exhibition in the Imperial Institute, London, particularly a number of dioramas depicting life in the Colonies.

Shortly before his serious illness His Majesty the King, accompanied by Her Majesty the Queen, paid a special visit to the Exhibition, and in Fig. 34 they are seen inspecting a diorama representing deer-stalking in the highlands of New Zealand.

General Scheme of Construction.—The idea behind the structural work of a diorama is to prepare a strong but rough framework with a rigid base, on which the various parts of the scene can be built up.

The back is usually curved in plan and built up of beaver board, or other building board, attached quite roughly with wire, nails and screws to a skeleton wooden framework to ensure stiffness and rigidity.

A Malayan Forest.—The next part of the work is to prepare for the various elements of the design. For example, this may be a dense jungle, such as the Malayan Forest scene depicted in Fig. 35, which was built at the Imperial Institute, London.

In such cases the tree-trunks are placed in position and the foliage added after the backscene has been suitably painted.

The representation of tropical trees calls for study of books containing large-size photographs or drawings of the appropriate specimens. The leaves, when large, may have to be individually fashioned from pieces of palm leaf or the like, by clipping them to shape with small scissors.

Artificial Leaves.—The smaller leaves can be represented by pieces of green paper, teased wool, or Egyptian fibre, glued to thin twigs.

Build up gradually from the backscene, leave some clear spaces to impart a sense of distance, and, to heighten the illusion, make the leaves diminish in size; this reduction should also apply to the tree trunks.

Small fern leaves, dried and then dyed, make up well in the foreground.

Jungle Animals.—A few wild animals should be introduced into the scene; when their size is appropriate the commercial articles sold in toy shops can be utilized.

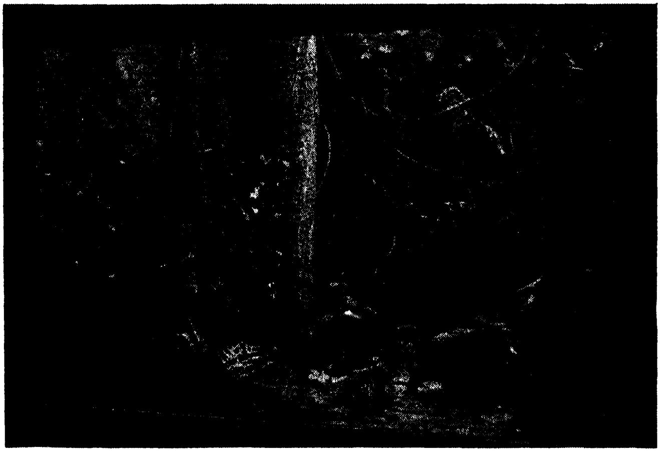

FIG. 35. A MALAYAN FOREST.

For the best effect these small toys should be repainted with non-glossy colours and generally touched up to represent the real thing.

Illusion of Distance.—The sensation of depth and gloom of the dense jungle is best conveyed by suitable colour control; in general those in the foreground should be rich, deep, luscious, gradually changing into softer and bluer tones in the distance.

A few touches of vivid colour—when appropriate—will help to emphasize the strength of the foreground, and thereby " throw back " the remainder of the scene.

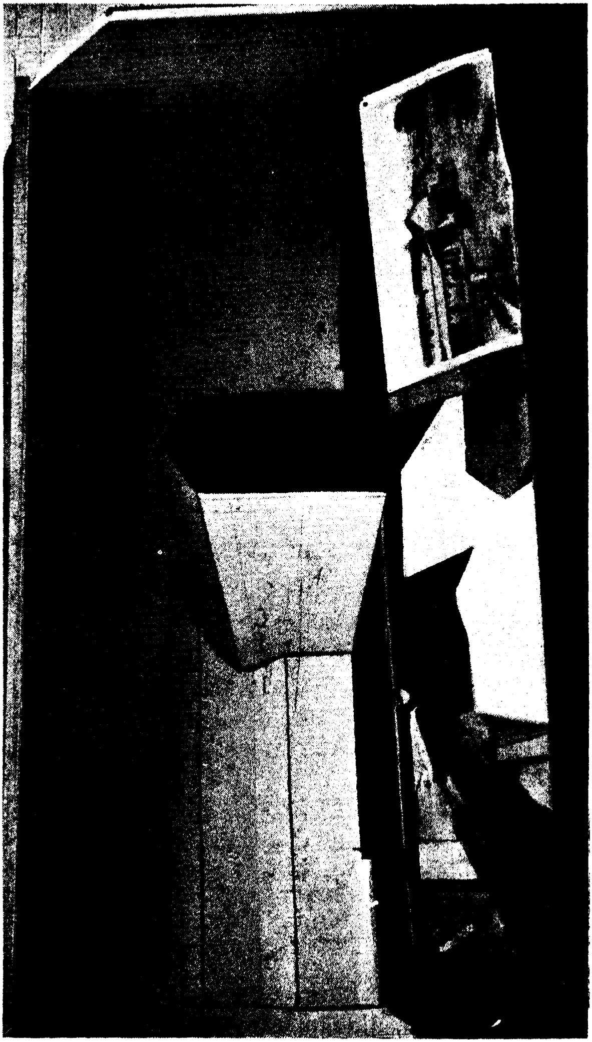

Fig. 36. Constructional Work on a Diorama.

Making a Diorama.—Before the actual work of construction is commenced, a coloured drawing of the complete scene should be prepared as a guide for the artist, for this is essentially an artist's job.

Decisions are then taken as to the treatment of the various elements, which parts shall be shown on the backscene and which must be wholly or partly modelled.

A framework and rough base are then built up with odd bits of material, to locate the chief buildings, variations of level and so forth, the work at this stage appearing somewhat as shown in Fig. 36, which represents the early stages of a model depicting life in Ceylon.

Surface Treatment.—The surfaces are then coated with plaster-of-paris, or treated with distemper; it may be necessary to use some wire gauze, or canvas, linen or the like to provide the necessary support for the plaster. As the work proceeds a part is coloured, another gradually modelled, a few figures placed in position to ensure a proper sense of proportion, space and characterization. By these means the scene is gradually created; it can scarcely be called anything else.

Progress of the Modelling.—Continuing in this way the raw appearance begins to disappear and the scene gradually changes from a mass of raw plaster to a thing of enduring beauty.

It is very difficult to give specific instructions for this part of the work; the modeller must do it personally.

Joy of Creative Work.—No other form of model work offers the same opportunity as does scenic modelling for the exercise of creative ability.

Moreover, it can be undertaken by anyone of any age; the child playing with a miniature farmyard demonstrates the facility with which some simple effects can be obtained.

Eminent artists do not despise the diorama as a means of expression, and in Fig. 37, Mr. R. S. Roussi is seen at work on a model of the Thermal springs of New Zealand, during its construction in the studios at the Imperial Institute.

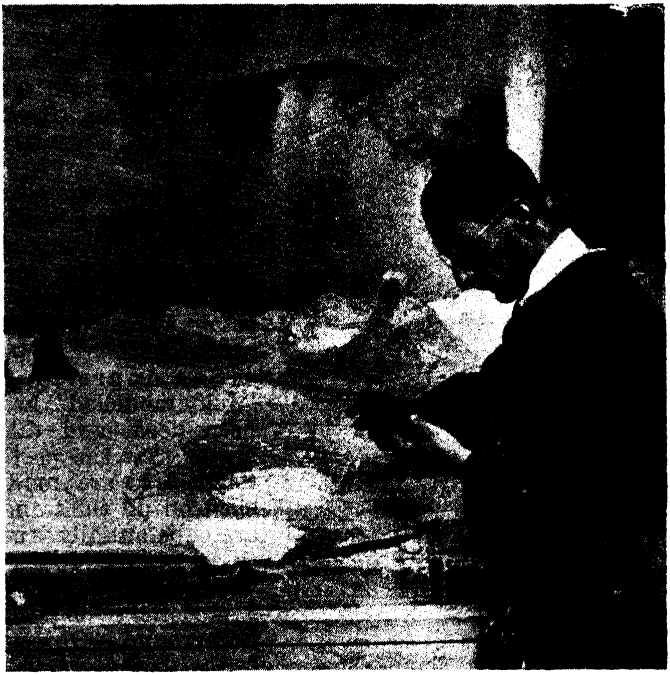

Fig. 37. The Artist Busy with the Modelling.

Flat and Modelled Work.—A close-up of part of a scenic model is given in Fig. 38, which has been marked to indicate the backscene, the latter reaching from *A* to *B*, the middle distance from *B* to *C*, and the foreground from *C* to *D*.

Everything that appears on the backscene is rendered in paintwork, the middle distance is partly modelled, and the foreground fully modelled.

Modelling in the Middle Distance.—One of the most important items when modelling objects in the middle distance is to make them relatively shallow or thin. In other words, the scale heights will be correct for the appropriate distances, but the scale depth, or distance from front to back, will be greatly reduced.

As the front part of the diorama is approached the depths of the objects are increased until they attain their true scale proportions.

The expression "fully modelled" has been used, and this means that the parts referred to are modelled on all sides and are substantially true to scale.

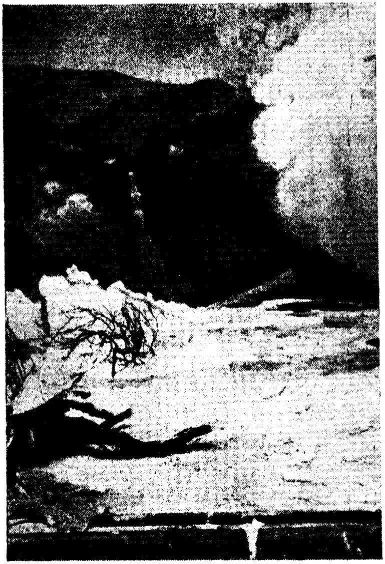

FIG. 38. DETAIL OF A NEW ZEALAND SCENE.

Modelling in the Foreground.—Objects in the foreground should be modelled with the greatest fidelity and care, and all parts kept in proper proportion.

In some cases, however, it is desirable to represent the object in perspective.

The object of doing this is to impart a sense of depth and distance, particularly in the case of a large building. This is a very important matter to consider and must never be overlooked when making a diorama or any other form of scenic model where the view-point is controlled.

Perspective.—Applications of the laws of perspective to a drawing or painting are well known and are described in numerous hand books.

In a scenic model, perspective may be considered as the quality it possesses of imparting a sense of distance. It is attained by the relative and progressive diminution in size and detailed treatment of the components of the model, and by the judicious use of colour and shading.

Model makers as a rule are not concerned with modelling in perspective, but on scenic models, or those backed by a painted scene, or by cut-outs and flats, it is essential to deal with the matter.

Progressive Diminution of Size.—Obviously, if a building is some way behind the principal object it should not be modelled to the same scale size, nor should it be represented by simple parallel lines. To attain a sense of distance and a due measure of realism, all the arts of the draughtsman and the painter must be called into play.

The scale height of a building in the foreground may be, say, 2 in., but a corresponding height on a building situated several hundred yards behind it may be ascertained by a drawing to scale, showing the assumed, or chosen vanishing point and the height of the building in the foreground.

Ascertaining the Rate of Diminution.—If a perpendicular to the horizontal base line is set up at the correct scale distance from the building in the foreground, the corresponding scale height of the second building can be ascertained directly from the linear dimension between the base line and the inclined line, measured along the perpendicular.

The relative scales for the modelling of the two buildings should bear the same ratio as that of the linear heights, ascertained as above described.

Changes of Scale in One Plane.—The changes of scale size as described above would be correct for the perspective in one plane of vision.

For example, the diagram, Fig. 39, shows a row of buildings in perspective and their relative scale sizes as they should be modelled for a street scene.

The glazed front of the diorama is represented at *A* the backscene at *B*, the upwardly inclined surface of the model at *AD*.

The basic plane is at *C*, and this determines the "scale" size of the model. Various planes of scale reduction are shown at *F*, *G*, and *H*.

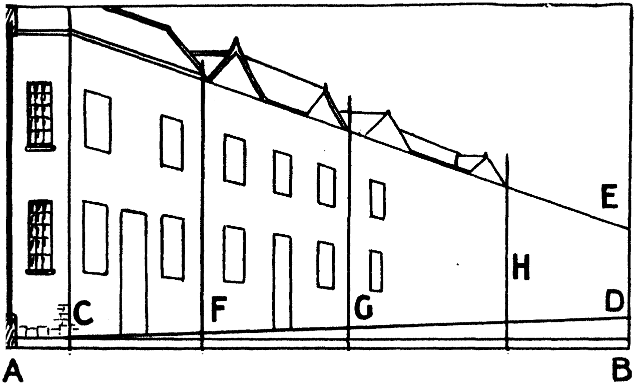

FIG. 39. CHANGE OF APPARENT SCALE IN SCENIC MODELLING.

If the scene were painted, it would be represented in perspective in the usual way, but if the buildings are separately modelled they will be to diminishing scales such as those indicated by the heights at *F*, *G*, and *H*. The corresponding scale height of a building on the backscene would be the distance *ED*.

Perspective Modelling in Two Planes.—Sometimes it is necessary to represent a building in perspective of two different degrees. This is shown in the diagram Fig. 40, where *AB* is the front corner of a building, *BD* is a roadway, and *AC* the diminishing line of perspective as seen when looking down the street *BD*.

The vanishing lines down the street *BF* are different to the former, as is indicated by the different angle of the diminishing line *AE*.

For these reasons the two front faces of the building should be modelled to accord with the different changes of scale necessitated by these changes in the lines of perspective.

Landscapes in Perspective.—Although the foregoing remarks are particularly concerned with the rendering of buildings in perspective, exactly the same treatment must be given to landscapes and all other kinds of enclosed scenic models.

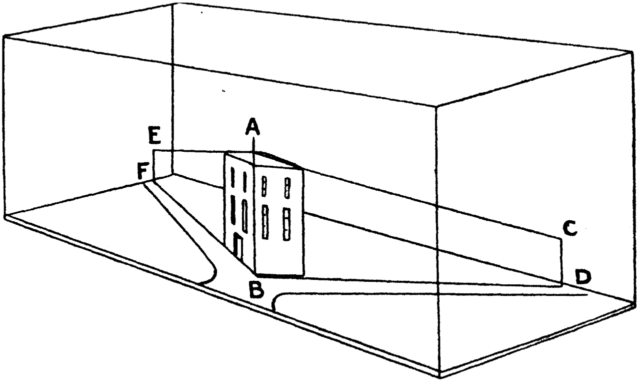

FIG. 40. DIMINUTION IN TWO PLANES OF VISION.

Open models are always built to one scale and without regard to perspective.

Another point to note is that the distance *BD* in Fig. 40, may represent say, half a mile, and the distance *BF* may be a quarter of a mile, whereas the height *AB* may represent only some 40 ft. or so. The depth from front to back is always greatly reduced in proportion to the height, consequently there is only a small space into which to compress a great deal of detail, and for this reason most of a scenic model is "face work." Only the visible faces of the scene are modelled—all else is subordinated; a sense of solidity and distance being obtained by modelling in perspective.

Perspective Work on the Backscene.—Similar methods can be employed in the treatment of the backscene, but here a fresh problem is introduced, because the scene can be viewed from many points, whereas the painting must largely be done as if the scene were viewed from one standpoint only.

A compromise is generally effected by making the backscene curved in plan, and adopting a modified form of treatment. The backscene should be so painted that a correct sense of perspective, as seen from strategic points, is obtained.

A vista down a street in the centre of the model would only be visible from the front whereas a curving headland with glimpses of the sea coast may be prominent on the right, but only clearly to be seen from the left side of the model.

The perspective of the street scene is therefore treated as seen from the front, that for the headland and coast-line, as they appear from a standpoint at the left of the model.

The intermediate views and aspects are treated as circumstances offer; a practical device is to interpose a tree or other convenient object for the purpose of breaking up a continuity of line and to impart a greater sense of realism.

CHAPTER VI

Architectural Modelling

ARCHITECTURAL modelling is concerned with the accurate representation of buildings in miniature. The best material to employ is Bristol board of appropriate thickness, but exceptionally large models are usually made with wood or metal. An example of such a model, given in Fig. 42, shows some buildings for a model over 17 ft. long, built by Mr. B. Audsley for the General Electric Co., of Schenectady, U.S.A.

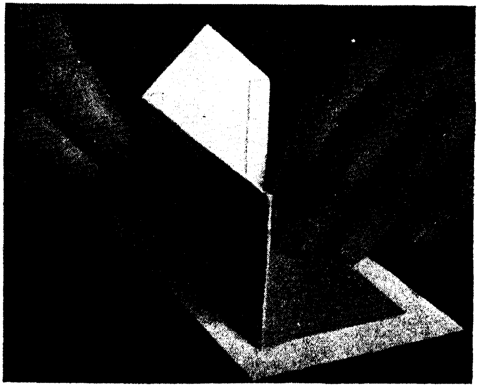

FIG. 41. BUILDING UP THE WALLS.

Built-up Models.—Models for scenic work can be made on the " built-up " system, shown in progress in Fig. 41. By this method a piece of card is prepared

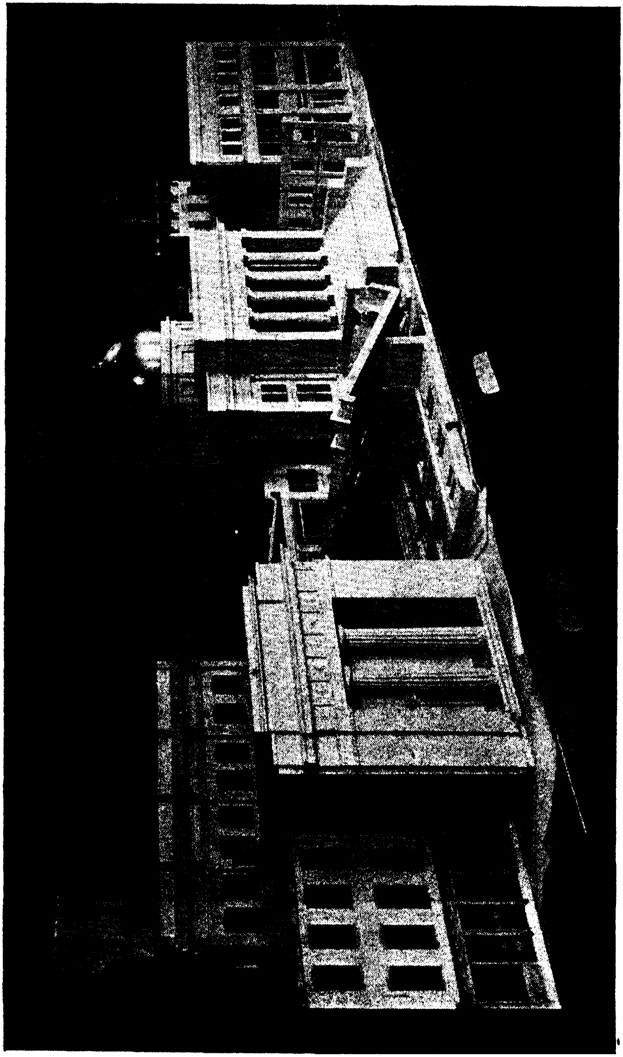

FIG. 42. GROUP OF ARCHITECTURAL MODELS DURING CONSTRUCTION.

for each separate wall surface and the whole is carefully assembled by gumming them together and mounting them upon a horizontal base composed of superimposed layers of stout card.

The Principles of Folded Work.—Small models, and especially those for scenic effects can be made on the "folded" system. The diagram, Fig. 43, gives several examples of the system.

The simplest case is a rectangular building as shown at *A*, where *W* is the West side; *S*, the South or entrance front; *E*, the East end and *N*, the North or back wall.

The outlines of the walls are set out very accurately, the card cut to shape and folded at "score" marks made at every place where the card is to be folded—as indicated by the dotted lines. A tab or fixing pieceis provided at the end of the north wall for fixing purposes.

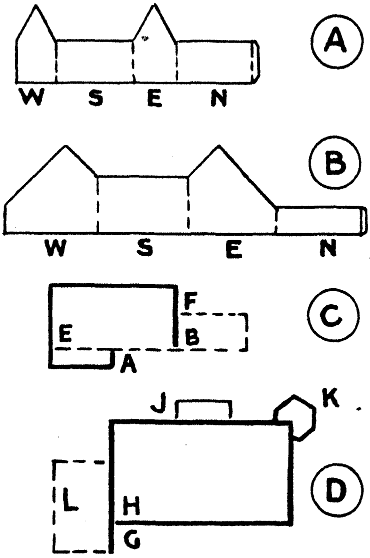

FIG. 43. DIAGRAM SHOWING PRINCIPLES OF FOLDED WORK.

The diagram *B*, Fig. 43, shows a similar lay-out for a building with walls of unequal height, such as those of a Sussex farmhouse.

Folding the Card.—Bristol board about 3 or 4 ply in thickness is the best; it allows of a fine "score" that is a cut half through the card.

The fold is best made by holding a ruler or straight-edge against the line of the fold and pressing the card upwards with the thumb, as shown in Fig. 44. After the folding, the tab piece is gummed and pressed to the inside of the West corner.

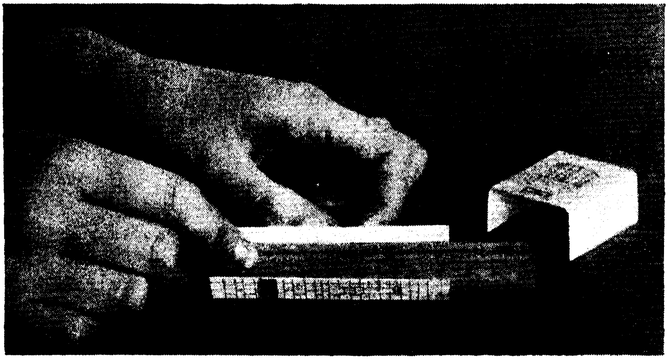

FIG. 44. METHOD OF FOLDING SMALL PIECES.

This completes the walls, which are then stuck to a rectangular base card, and the roof subsequently covered.

The walls can be painted before or after folding, whichever is most convenient for the work in hand.

Irregular Folded Work.—It is inadvisable to attempt to fold a card more than three or four times. When the plan necessitates a greater number, as at *C* in Fig. 43, it is desirable to use two separate cards, each folded as described, but one reaching from *A* to *B*, and the other from *E* to *F*; this ensures stiffness and accuracy.

An irregular plan such as that at *D* in Fig. 43, should be made with four separate cards, as shown, the main wall card running from *G* to *H*; the bay at *J* being a separate two-fold card, as is that at *L*, while the corner piece *K* is a five-fold card.

Laminated Work.—Some delightful effects can be obtained with laminated or superimposed cards as in Fig. 45, which shows a trellised panel for a summer-house, during construction.

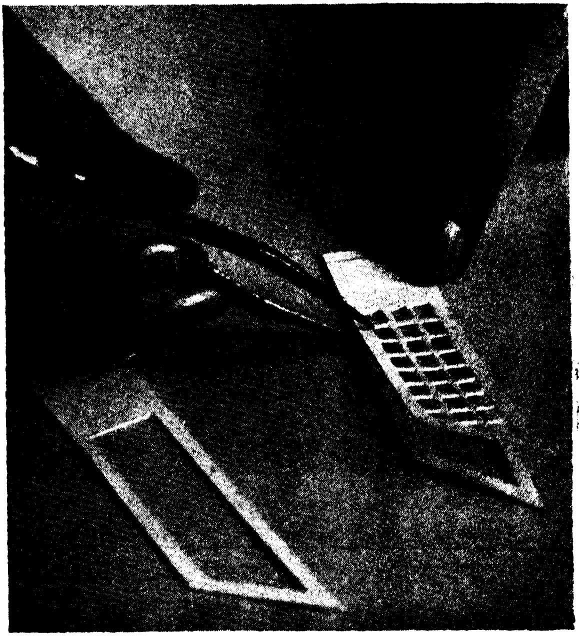

FIG. 45. EXAMPLE OF LAMINATED WORK.

The central card is cut out to represent the trellis-work, the two outer cards are cut to represent the main framework.

All these are glued together and allowed to dry under pressure.

Roof Coverings.—There are many difficult problems in connexion with roofing, some of them conditioned by the scale size of the model. The simplest way is to cover the model with card, shaped as requisite and gummed to the walls.

A rectangular card, scored along the centre of the length and folded at the ridge, is all that is needed for rectangular buildings as at *A* and *B* in Fig. 43.

When the roof is " hipped " or slopes at the end the shapes of the cards are as shown at *A* in Fig. 47. The fishtail end *C* forms the front and back slopes of the roof and the triangular opening at the end is closed by a separate card as at *E*. The width of the base is equal to that of the walls, the length of the sloped sides—as at *D*—must equal those on the main roof card *C*. The shape *F*, Fig. 47, is appropriate for a gable roof projecting at right-angles from the main roof.

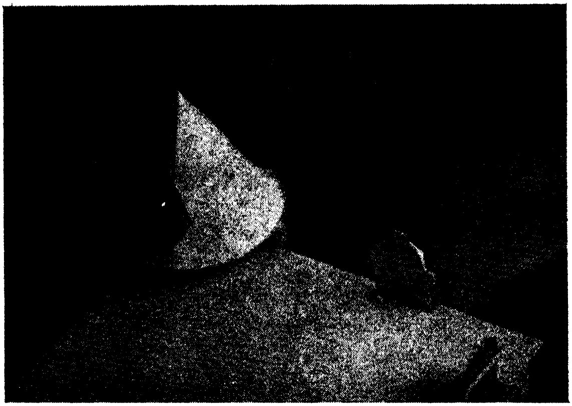

FIG. 46. MAKING A CONICAL ROOF.

Treatment of Eaves.—When the underside or soffit of the eaves has to be closed, a flat card is fixed to the top of the walls corresponding with the true plan of the eaves. The roof sections are then applied to this card.

Hip Joints on the Roof.—Hip joints are difficult to make perfectly. A helpful plan is to let the hip card overhang the main roof card, and after the adhesive has set hard, remove the surplus by rubbing with very fine old sandpaper.

Corrugated iron roofs can be represented with ordinary corrugated packing-paper, coloured with red ochre and completed by ridging. The same material, if well flattened makes a passable representation of a tiled roof. The corrugations are, in this case, laid horizontally; the ridge and the hips are covered by ridge strips of card.

Parapet Roofs.—Parapet roofs are dealt with similarly to the foregoing, but the roof cards are set inside the top edges of the walls, upon an inner card fixed horizontally at a little distance below the top of the walls.

Old-world buildings with stone roofs are difficult to model nicely, but can be represented with thin sheets of plaster. The sheets must be cut into small, irregular shaped slabs before it has quite hardened, and the exposed edges tapered off so as not to appear unduly thick. Correct colouring is a most important matter on all classes of scenic roof modelling.

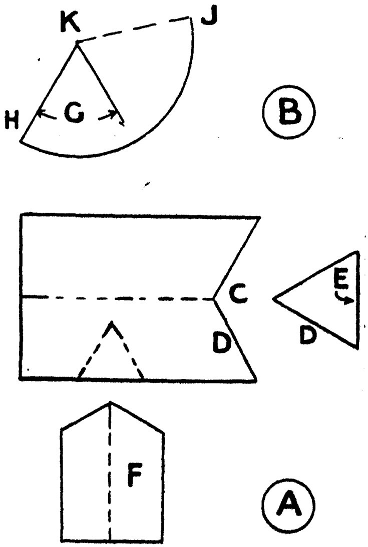

Fig. 47. Diagrams Illustrating Development of Roof Surfaces.

Conical Roofs.—A small conical roof is shown in Fig. 46, and the method of setting it out, in Fig. 47, at *B*.

From the point *K* draw a line *KH*, equal in length to the height of the roof, and from it set off the angle *G* corresponding to that of the desired roof. From the centre *K* describe an arc of a circle *HJ*. Make the length around this arc equal to the circumference of the base of the roof. Join *J* to *K*. This will be the shape for the roof-card, and after it has been cut it is rolled up to form the cone, and the ends gummed together.

The Old Curiosity Shop.—The small scenic model of this historic old building, shown in Fig. 48, is reproduced from "Pictorial House Modelling." It was built by the author on the system described therein and in

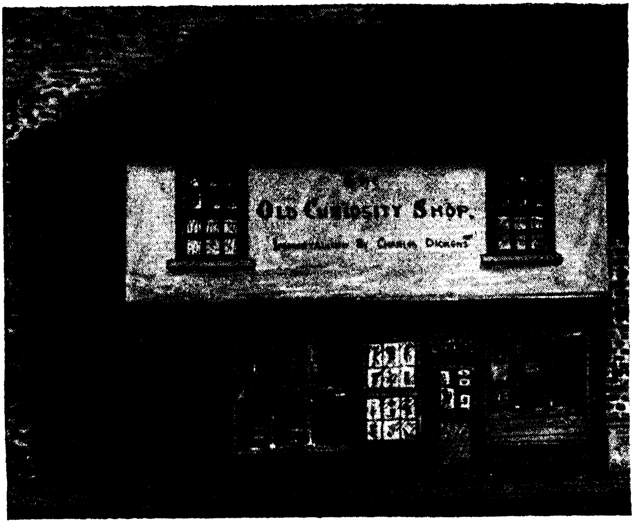

FIG. 48. THE OLD CURIOSITY SHOP.

this chapter, and is painted throughout with water colours.

The walls are made in two distinct portions, those of the shop being cut out and folded. These were floored over with thick card and the upper walls fixed to the top. These were cut and folded as already mentioned, covered with a flat soffit card, and the roof built up with separate pieces, owing to its peculiar shape.

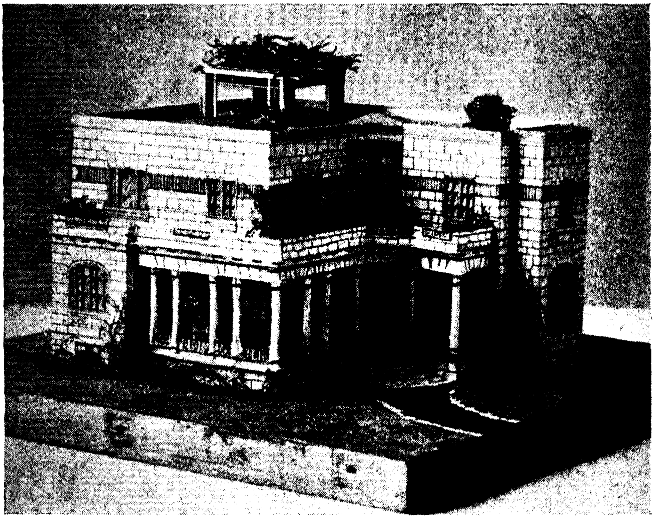

Fig. 49. Model of a French Villa.

Model of French Villa.—The modern villa illustrated in Fig. 49, is built from designs by an eminent French architect, for a home on the Côte-d'Azure.

It is a two-story building, with a flat roof used as a garden with a pergola and other attractions.

The main walls are " folded," all the projections are separately folded and built on, and the whole is lined and painted to represent stonework.

A view of the entrance front is given in Fig. 50, where a small wooden column is being placed in position with tweezers. The model is quite small—rather less than 3 inches high, and is mounted on a small rectangular wooden base for subsequent insertion in a showcase.

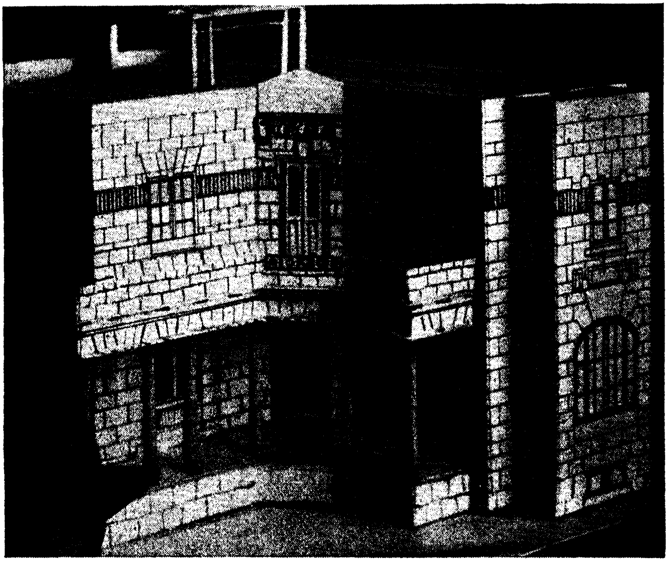

Fig 50. Setting up the Columns on the French Villa.

Modelling Columns and Pillars.—Small columns, pillars and other structural parts for small scenic models can be made from match-sticks shaped by filing and sandpapering. More elaborate specimens can be turned in a lathe, or nicely carved.

Half-Timber Work.—Many of the old-world homes of Britain are built in the half-timber style, redolent of

Elizabethan days; of which a fine example is illustrated in Fig. 51.

It represents a sixteenth century Manor House, is built to a scale of ¼-in. equals 1 ft., and is largely of wood. The windows are glazed with talc set in the wooden frames.

The charm of this style of architecture is apparent by the interest taken in modelling such buildings. The early half-timber was carried out with heavy, massive timbers, roughly hewn to shape and squared up, hence the timbers did not look regular, nor were they always perpendicular.

FIG. 51. EXAMPLE OF HALF-TIMBER WORK.

The spaces between the timbers were likewise uneven, and these factors partly account for the fascination of buildings so constructed.

Freedom of Treatment.—When a model has to be made to reproduce these features, a certain freedom of treatment, including a considered inaccuracy of line and a change in surface contour, will in some measure catch the true feeling of the original.

In the case of small models built of cardboard, the timbering can be done very well by building it up on the face of the wall surface with strips of thin cardboard, cut with scissors in such a manner as to exhibit a slight curvature consonant with the prototype.

The Wall Panelling.—These strips are then gummed on their backs, applied to the wall surfaces, and as the gum reaches the tacky state can be pressed lightly sideways as required to obtain the desired realism. Arrange the strips in a proper way, commencing with the bressemer or lower horizontal member, then the uprights with their lower ends, or feet, touching the upper edge of the bressemer strip and so on. In this way the minute cracks represent real joints and look structurally correct.

Painting the Timbers.—Next proceed to colour the timbers, preferably with water-colour paint, using brown umber, or vandyke brown at the start, and represent the grain, and principal longitudinal splits—always apparent in old oak—by means of a very dark brown. Go well over the edges so that white lines will not appear on the finished model.

Brick Nogging.—The treatment of the panels is determined by that of the prototype. When brick nogging is used a good plan is to represent it by first painting the panel surfaces with Process white, with the addition of a trace of white powder, whiting for instance.

This when dry and coloured has a texture which looks very well. The bricks can be painted in one by one, when their arrangement or bonding becomes very important, but a better plan is to treat them in a free style, not studying each brick, but aiming at getting an impression of brickwork generally, leaving a few streaks of the white background visible to simulate the mortar joints.

Rough-cast Surfaces.—Judicious blends of colour, the introduction of rectangular patches of darker colour, and a few traces of greens and greys washed over the surface will all help towards the desired result.

To represent a rough cast or wattled and daub finish, paint with Process white and powder as before, and when dry go over the surface with local washes of palest grey, green and yellow, just strong enough to break down the harshness of the white background.

Stained Glass Windows.—Stained glass windows are difficult to render in miniature, especially when they are to be illuminated from the interior of the model.

Photographic methods have much to recommend them when access to the original is practicable. In such cases a photograph is taken as nearly "flat on" to the window as may be feasible, and a "positive" on glass is made from it in the same way as if it were a lantern slide.

The actual size of the window as it appears on the positive must, however, be full size for the model. When this positive has been developed, the glass is carefully cut to the outline of the window frame, and then each separate pane, or the separate outlines of the design, can be coloured on the film side with the transparent colours used for painting lantern slides.

CHAPTER VII

Landscapes and Buildings

LANDSCAPES are particularly attractive subjects for scenic models. They provide ample scope for individual taste and offer unlimited opportunities for the exercise of ingenuity and craftsmanship.

Landscape Window Display.—An example of the possibilities in this way of landscape modelling in a shop window is given in Fig. 52, which shows how very

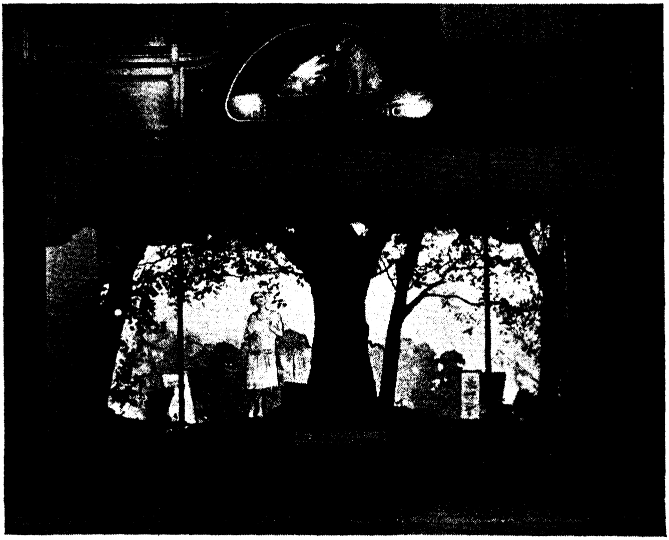

FIG. 52. LANDSCAPE, BY THE GRAMOPHONE CO., LTD.

effectively The Gramophone Company converted a window in the West End of London into a realistic scene in a park.

The lines of the composition are those of a flattened triangle, with a dominant centre-piece, in the form of a tree trunk.

This gives scale to the life-size figure beside the portable gramophone, which is placed on a grassy bank, represented by green coco-fibre and moss.

The site is supposed to be on the brow of a hill and the backscene is painted accordingly.

Artificial Leaves.—Sundry smaller tree trunks and leafy boughs with fully modelled artificial leaves complete the foreground.

The various contours of the model provide ample concealment for electric lights which illumine the scene at night.

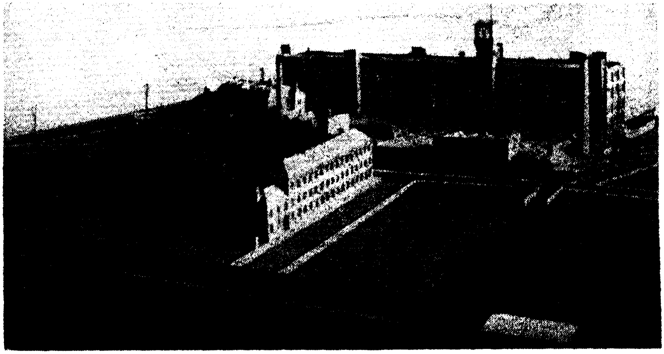

Fig. 53. Factory Model, by Messrs. Bassett-Lowke, Ltd.

Industrial Areas.—In an industrial area the landscape is overpowered in interest by factory buildings, at least so far as the generality of this class of model are concerned.

A case in point is the open scale model of a factory and buildings shown in Fig. 53 ; a few grassy plots, a little river, and a roadway with electric tramcars suffice to indicate the general characteristics of the adjacent country.

Factory Models.—Models of this kind are almost always professionally made, and exactly to scale. The bulk of the work is carried out with thin wood and card, windows are generally glazed with thin glass and the whole made in strict accordance with the architect's plans.

A Scene in Fairyland.—Fantasies and fairy tales are quite delightful as subjects for scenic models ; they enable the builder to give expression to some of the prettiest stories in the world, and have a charm peculiarly their own.

Many models of this kind are exhibited at Christmas time, some in exhibitions, others in the windows of the great stores.

One example of this class of model is shown in Fig. 54, which is part of a large window display by Selfridge, Ltd., of Oxford Street, London.

Pumpkin Town.—This model is a composite construction embodying a painted backscene, a number of papier-mâché figures and pumpkins, and several plaster toad-stools.

The treatment of the middle distance with pieces of real foliage and rushes is particularly effective. The tree trunk is modelled in relief, the smaller fir trees are natural.

The lines of the composition are admirable and serve to enhance the perspective, as well as emphasizing the fairy-like proportions of the homes in the pumpkins with their little steps, doors and brightly illuminated windows.

A Rural Homestead.—Country homes of modern design are nowadays a feature of rural landscapes.

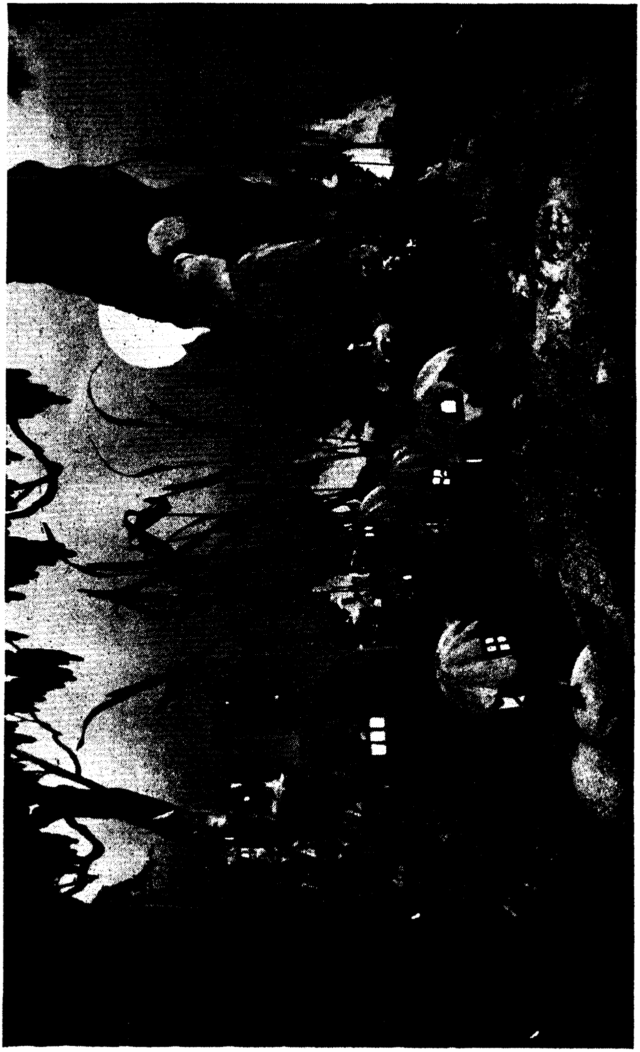

Fig. 54. "Pumpkin Town," by Messrs. Selfridge, Ltd.

The illustration, Fig. 55, represents such a building set in a pleasant garden.

The house is built to a scale of $\frac{1}{8}$ in. equals 1 ft., and measures about 3 ins. from the ground to the ridge. It is a combined "folded" and built-up model, constructed of four-ply Bristol board.

The illustration shows the house and garden, on its base, but before the backscene was fitted.

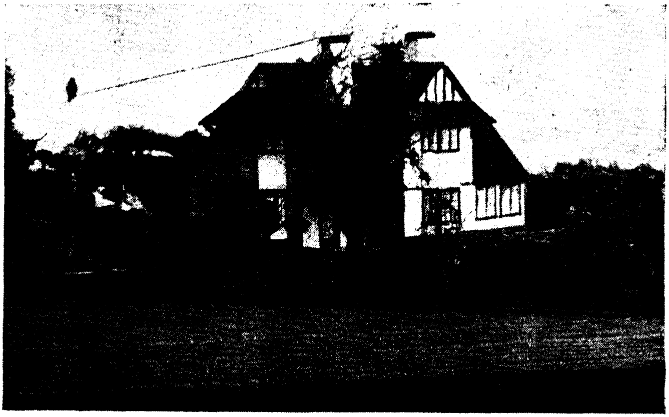

FIG. 55. HOUSE IN RURAL LANDSCAPE.

The base is built as described in Chapter II, and has a contoured surface, the grass being represented by "flocked" paper. This is obtainable from most of the leading wall-paper supply houses; it is a pleasant grassy green colour, and has a surface and texture akin to velvet.

Representing Grass Lawns.—Flock paper is rather thick, but can be fixed to the base with strong flour paste, if the paper is damped with clean water and allowed to stand until it has become quite limp.

Sundry small trees and shrubs and a number of garden accessories are visible in the illustration, and will serve as a guide when making a similar model.

Miniature Sundial and Seat.—Small garden ornaments such as the sundial and seat shown in Fig. 56, bird baths and the like, can be modelled in clay or Plasticine, or they may be roughly formed in plaster-of-paris and subsequently filed and carved to shape.

Another plan is to build them up from Bristol board, a method which is recommended when the parts are rectangular.

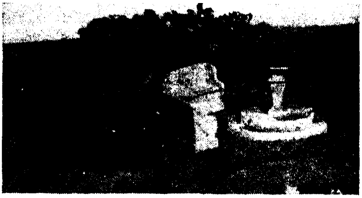

Fig. 56. Sundial and Garden Seat.

Plastic Wood.—Plastic wood comes in useful for some of these small parts, but it takes a good deal of agility to make a neat job. The best results are attained by roughly shaping the wood while in the plastic state. After it has hardened the final modelling is imparted by filing or carving.

Japanese Bridge and Island.—Something a little out of the ordinary is shown in Fig. 57, which represents

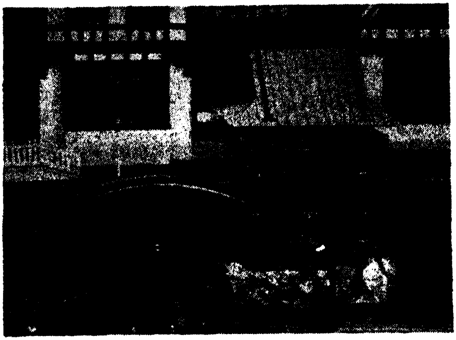

Fig. 57. Japanese Bridge and Island Temple.

a Japanese bridge and temple, the latter situated on a miniature island.

Every part of the bridge and the temple building are made of Bristol board, each piece being cut to shape and the whole gummed together.

The island is built up of plaster faced with tiny pieces of knapped flint, the water being represented by a sheet of glass.

A Pond in Miniature.—The admirable little pond shown in Fig. 58 consists of a small piece of mirror, about 2 ins. long and 1½ ins. wide, with suitably modelled surroundings.

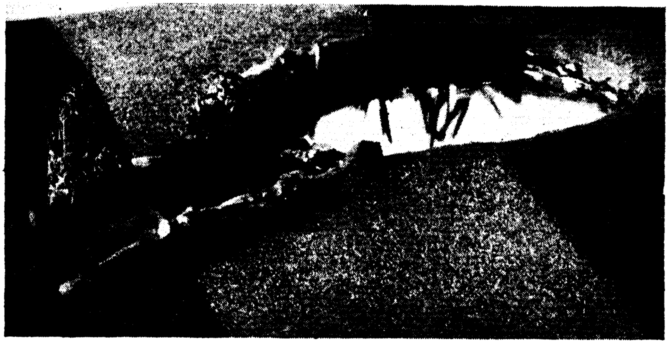

Fig. 58. Treatment of a Small Pond.

To construct such a feature set the mirror in a small depression in the surface of the model. Then build the banks around it with plaster or modelling clay, and while it is still wet embed tiny pieces of broken stone in the bank sides.

Prepare a few clippings of stiff dark green paper, to represent the rushes, inserting them in holes pierced in the plaster.

Build up the pathway and steps in the usual way, colour the plaster, and cover the surface around the pond with flock paper.

Miniature Rockwork.—The procedure is to prepare the groundwork and build the rockery with chippings of real stone. The stones should be embedded in adhesive, stained dark brown colour by the addition of a dry powder, which will hold them together and represent loam or sand.

The shape of the pieces of stone should be suited to the character of the natural rock which it is supposed to represent.

Whenever it is impracticable to obtain stone, an alternative is to carve the rock forms from solid blocks of plaster, or lime wood, and finish them by paintwork.

Roadways and Paths.—Roadways can be effectively represented by working up the surface with plaster-of-paris, or by carving a strip of wood.

Others that are sunk below the surrounding level must be fashioned on the baseboard or upon a sub-base and the banks and other natural features built alongside in a realistic manner.

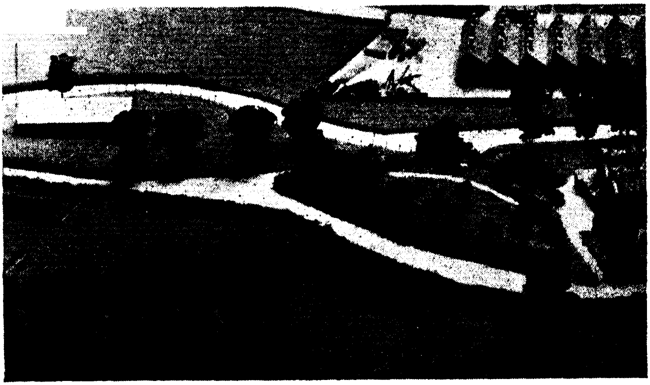

Fig. 59. Part of a Rural Landscape.

An impression of the realism of these methods can be obtained from Fig. 59, which shows part of a rural scene.

Treatment of Road Surface.—The road surface is generally represented by paintwork, the pigments being mixed with fine powder to impart a certain texture or grain. The powder should be varied sufficiently to distinguish between, say, a tar-macadam road and a gravel-surfaced carriage drive.

The whole road surface should never be treated in one uniform colour, but be relieved with long lines to suggest the wheel-tracks of fast cars, and perhaps a few dark patches of oil suggestive of a motor-bus stopping place.

Gravel Paths.—These can be represented by fine sand rolled into the surface of moist yellowish brown paint, touched up when dry with streaks and patches of darker colour.

Rivers and Streams.—The modelling of a river or stream presents peculiar problems, for, above all, a river is mobile, and is constantly changing in colour.

Something of this life and character, something of the atmosphere and the allure of the flowing water, must be introduced into the model.

The qualities of any slowly moving stream of water which can be represented with some close approximation are the power of reflection, transparency, a slightly undulating surface, and a variety of colours.

Several of these qualities can be reproduced with considerable fidelity by a well-chosen sheet of glass. Where only a portion of the river is visible, a piece of silvered mirror is perhaps as good as anything.

Transparency Effects with Glass.—A piece of rippled glass, or " Cathedral " glass, of a bluish-green colour, slightly painted on the underside and flecked on the upper side with curling eddies, will improve the appearance.

Another admirable way of representing a river on a large scale model consists in the modelling of the river bed in a realistic manner at a lower level than the surface. The water is represented by ordinary window glass, cut at the edges to conform to the contours of the bank side.

The edges of the glass should be painted to correspond in colour with the banks, and the whole then built into place.

Trees and Shrubs.—One of the most difficult tasks that befalls the model craftsman is the representation of trees. Choice of method depends on the scale and the nature of the trees. Most of them can be built up from twigs of a characteristic shape, corresponding with those customarily seen on trees of the usual varieties.

A good photograph is the most serviceable guide during the modelling processes.

Preparing the Foliage.—Prepare the twigs by cutting

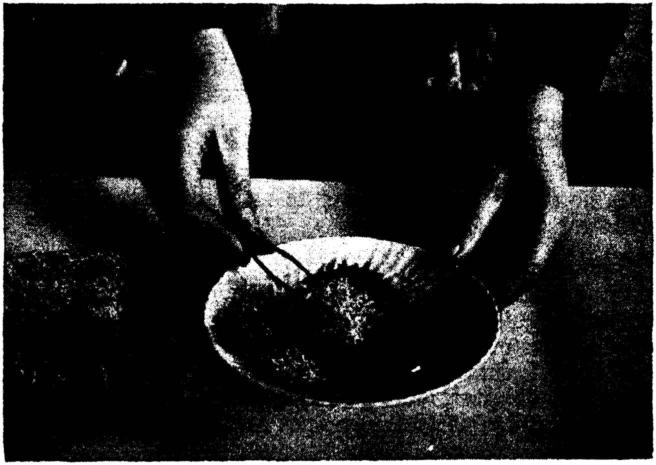

FIG. 60. DYEING THE EGYPTIAN FIBRE.

and bending them to natural shapes, next prepare a sufficient quantity of loofah or sponge by teazing it with a pair of tweezers to soften and fluff out the fibres. The teazing is done by pulling out the fibres to make them fluffy.

Dye the material with a staining colour, Batik dye, or something similar. A small quantity in a saucer is sufficient, and it is desirable to use tweezers as shown in Fig. 60 with which to turn and twist the pieces of loofah about in the liquid dye.

When dry the pieces are again teazed, if necessary, and suitable pieces are drawn into place on the twigs and secured with adhesive ; thus the tree is gradually built up.

The fibre or the sponge should be clipped here and there to impart a natural appearance, and it is helpful to sprinkle a little green silk flock on the work as it proceeds, having previously dabbed the necessary places with an adhesive.

Shrubs and Bushes.—Small trees, shrubs and bushes can often be clipped to shape from fine sponge and mounted on a piece of twig to represent the trunk. Very effective results are obtainable by using bare twigs to represent the leafless trees of winter.

Particular attention must be given to the colouring of fruit trees in blossom, laburnum trees in flower, and others of like kind. The simplest of materials, such as grains of rice, sago, and disks of paper crinkled up into suitable shapes may be used to represent berries, fruits or flowers.

Embankments.—Embankments, cliffs and other marked changes in contour of the earth surfaces are generally built up on a framework of batten, covered with canvas or other material and modelled in plaster.

Work of this kind is more fully explained in the following chapter, the methods there described being equally applicable to landscapes and seascapes.

CHAPTER VIII

Seascapes and Shipping

THE majesty and fascination of the sea has inspired model-makers from the earliest times in the world's history.

Volumes could be written about ship models—scenic and otherwise—but in this book it is only possible to

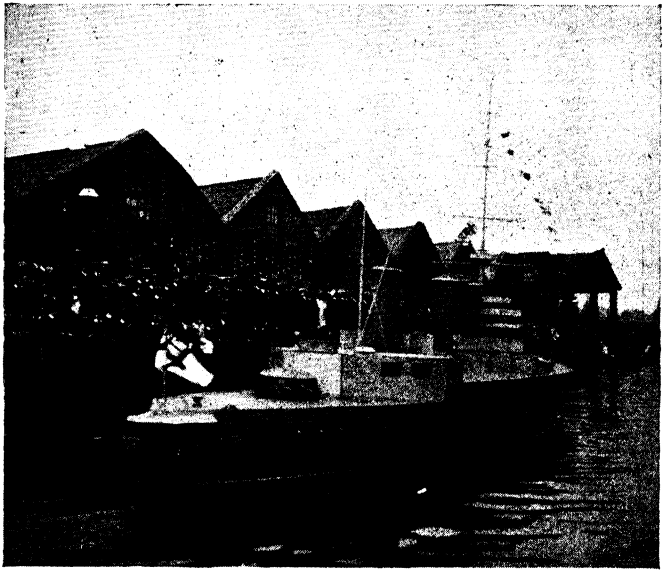

FIG. 61. WORKING MODEL BATTLESHIP ON THE RIVER NENE.

give a few typical examples of widely differing scenic seascapes and ship models.

A Miniature Fighting Fleet.—One of the finest spectacular models ever built was the fleet of miniature fighting ships, used for the naval display at the Imperial Services Exhibition at Earl's Court, London, in 1913.

The *Queen Mary*, the largest of the fleet, is shown in Fig. 61, during her trials on the River Nene at Northampton.

The fleet comprised nine vessels, ranging in length from the 25 ft. of the *Queen Mary* to 12 ft. of the destroyers. The average displacement was just over a ton each, and all the ships were equipped with electric motors, guns to fire, searchlights to light up and a hundred and one other attractive devices.

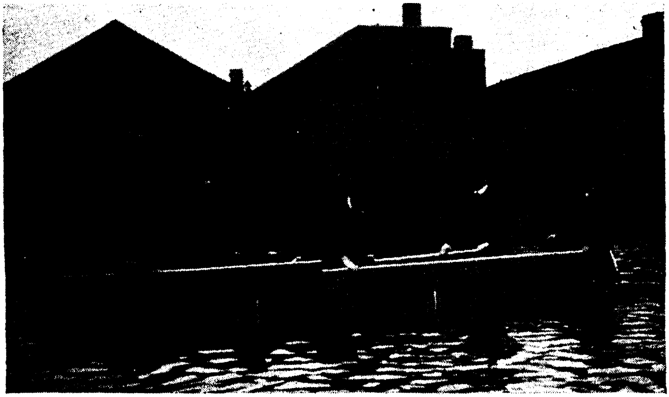

FIG. 62. TESTING THE HULL OF SCENIC BATTLESHIP.

Constructing the Miniature Fleet.—The hulls were correct to scale above the water-line, but fashioned like a sharpie below water with sawn ribs and a riband carvel skin.

One of the hulls under test is shown in Fig. 62, while the fleet at Earl's Court is illustrated in Fig. 63. This view shows the painted backscene and the flies, one of which is about to be hauled into place.

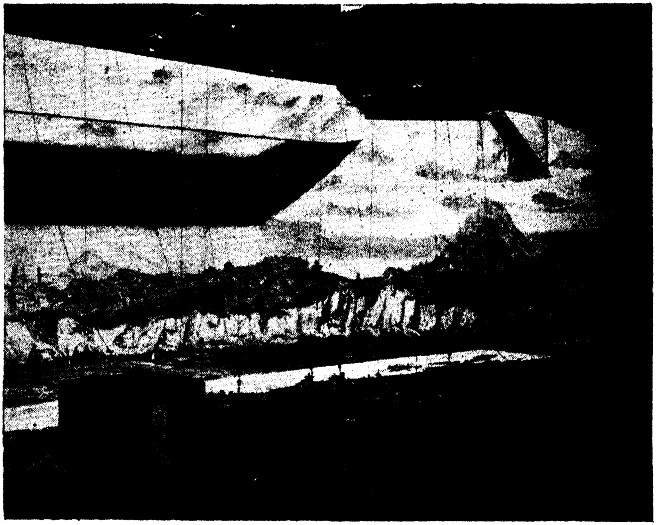

Fig. 63. Scenic Model Work at Earl's Court, London.

When all was completed, the arena was filled with water and the fleet gave a wonderful display of naval evolutions and took part in a furious battle.

The designs for the entire fleet were prepared by the author, and the construction carried through by Messrs. Bassett-Lowke of Northampton, to whom the author is indebted for the photograph of the fleet at Earl's Court.

Scenic Model of the Port of Durban.—A magnificent model of the City and Port of Durban, South Africa, is

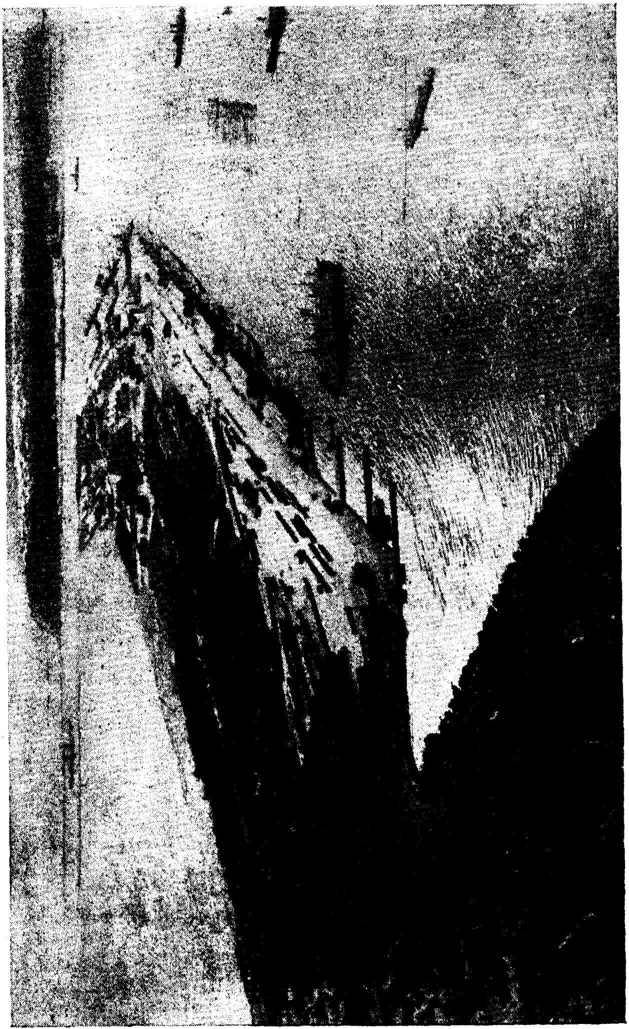

Fig. 64. The Port and City of Durban.

illustrated in Fig. 64, by courtesy of the makers, Messrs. Twining Models, Ltd., of Northampton.

This fine model, on exhibition at the Imperial Institute, London, is built to a scale of 100 ft. equals 1 in., and despite the smallness of the scale, it has been carried out with astonishing fidelity and realism.

The treatment of the sea, the floating dock and the buildings generally should be an inspiration to any amateur model maker.

Cape Town in 1858.—A very interesting model—that shown in Fig. 65—was built about seventy years ago, and is now on exhibition in the Imperial Institute, London. It represents the harbour of Cape Town, with a number of the fine old sailing ships which were in extensive use in those days. Over fifty different ships are shown on the model, which is built to a scale of 40 ft. equals 1 in., but the great size of the model makes it impossible to show more than a few of them in a single picture.

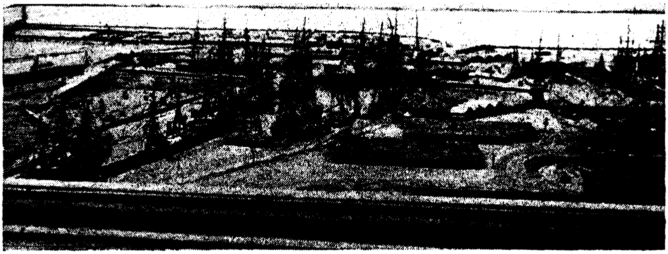

FIG. 65. OLD SCENIC MODEL OF CAPE TOWN HARBOUR.

Whaling Amidst Ice Floes.—Perhaps the most realistic scenic seascape that has ever been modelled is that shown in Fig. 66, depicting a whaling scene amidst the ice-floes of the Antarctic.

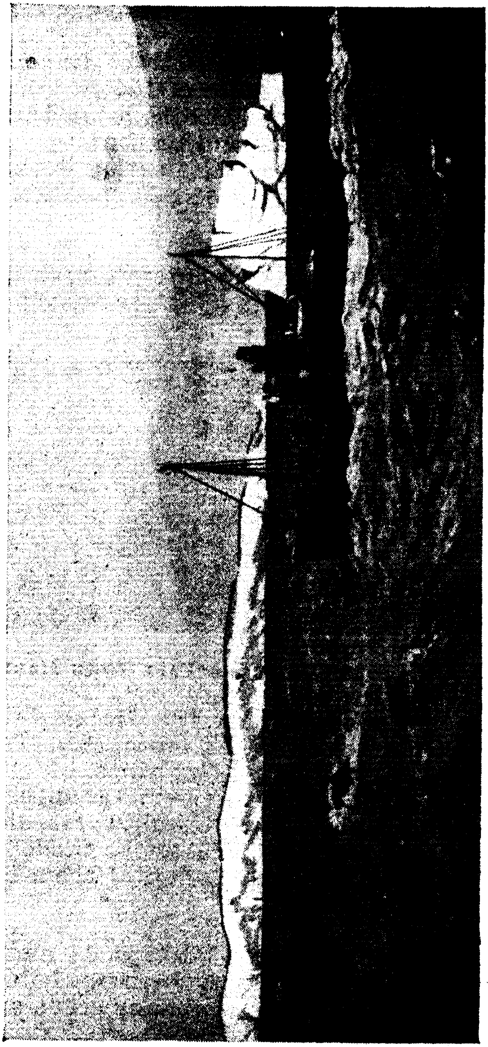

Fig. 66. Whaling in the Antarctic.

The effect is so realistic that one seems to feel the intense cold, and to shudder at the restless heaving of the sea, which is exceptionally well carried out.

The model is in the form of a diorama and shows in the foreground a steam-driven whaler. A rorqual whale has been struck by an explosive harpoon, attached by a line to the steamer. A man in the crow's nest is directing operations, while in the distance is the body of a dead whale with a red flag on it, awaiting removal.

The backscene is vividly executed and represents part of the great ice barrier, while in the middle distance is a floating iceberg modelled in low relief.

The model was made by Mr. H. K. Rooke for Messrs. McCorquodale & Co., Ltd., London.

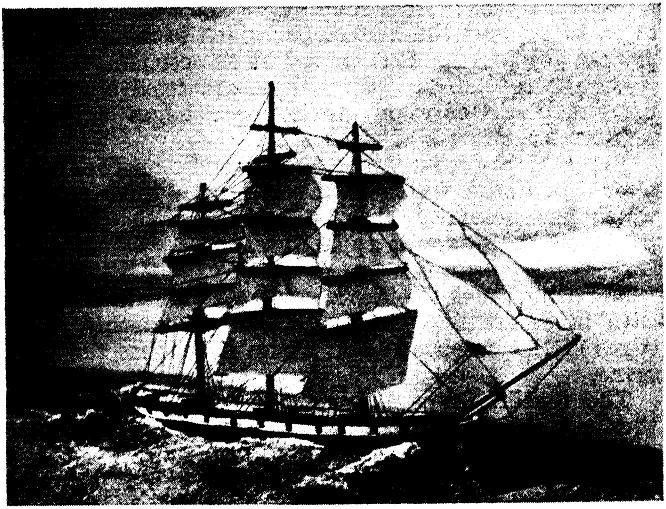

Fig. 67. A Clipper Ship at Sea.

Model of Clipper Ship at Sea.—A scenic model, built largely by Miss E. Smith from designs by the author, is shown in Fig. 67, and represents the celebrated clipper ship *Cutty Sark* on one of her record-breaking voyages.

The case measures some 30 ins. in length, the ship model is about 9 ins. long, or to a scale of 32 ft. equals 1 in.

A brief description of the methods adopted for the construction of this model will serve to indicate the general lines which should be followed for all similar seascapes, but readers who desire the most complete detail of the modelling of clipper ships should refer to a book by E. W. Hobbs, entitled " How to Make Clipper Ship Models."

Making the Base and Framework.—A plain piece of board is used for the base, well supported underneath by cross battens. Four rough uprights are then screwed to it, to support the backscene, which is made of four-ply Bristol board and is curved at the corners.

On the top surface of the base are fixed a series of upright pieces of wood, their upper edges curved to represent the crests of the waves.

These cross-pieces are set diagonally on the board, after which the whole is covered with butter muslin which has previously been saturated with plaster-of-paris and water, and is applied wet.

Modelling the Sea.—The impregnated muslin is secured with brass drawing pins and finished smoothly at the edges of the baseboard and where it touches the back-scene.

The muslin drops between the upright pieces and thus naturally assumes a wave-like appearance.

Plaster-of-paris is then worked over it and smoothed out and modelled to simulate the sea, and at the same time is worked into any odd corners as may be requisite.

Before the plaster has got quite dry, which will take a day or so under normal conditions, proceed to wash it over with " poster " colours and water, using those which will predominate when the model is finished.

Making a Scenic Ship Model.—Most of the ships used on scenic models are built on the " water-line " principle, as is the case of the *Cutty Sark* mentioned above, and shown under full sail in Fig. 68.

The hull is made by sawing it to the shape of the deck plan and fashioning the bow and stern with a pocket-knife or with small carvers' tools.

This rough hull is then pressed firmly into its place on the " sea " of moist plaster and should make a deep impression therein. After this has been done, the masts and spars are filed to suitable tapers, using thin hardwood, matchstick or wire.

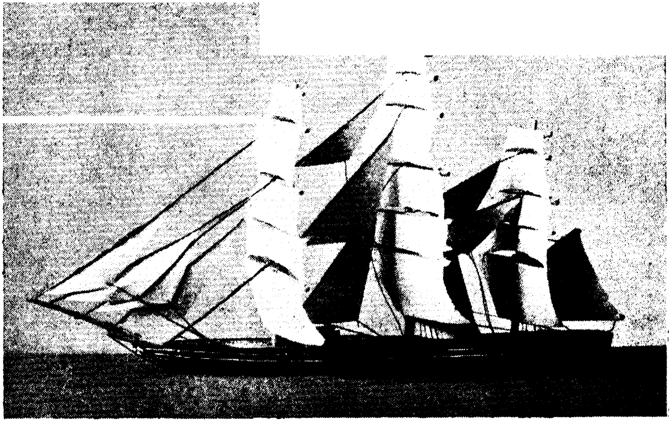

FIG. 68. SCENIC MODEL OF *Cutty Sark*.

The masts and yards are then assembled on the hull, any prominent deck erections prepared and fitted, and the deck and other parts suitably painted.

Rigging a Scenic Ship Model.—The rigging is carried out with cotton, thread or silk and is generally gummed into its place. The sails are then cut to shape from soft biscuit-coloured paper and gummed to the yards.

They should be curved somewhat so as to appear well-bellied by the wind.

The bowsprit and headsails can be added after the others are finished, and the work can then be completed by neat paintwork.

Placing and Finishing the Ship.—After the ship model has been completely finished, it should be fixed in the impression in the plaster sea, and secured with adhesive.

The modelling of the waves at the bow can then be continued by sticking on a few wisps of white cotton-wool, pulled out to represent the breaking water.

Complete the modelling of the waves by detail work on the plaster, shaping it as requisite with carvers' tools, and finish off by careful paintwork.

Representing the Deep Sea.—The best guide while painting is to keep a really good water or oil-colour painting or other reliable coloured reproduction at hand and use it as a check on the colours.

Note how the richer and deeper blues denote and simulate the depth of solid water, whereas the lighter colours and translucent greens indicate the light shining through the crests of the waves.

Browns, purple, grey, and flakes of other colours all help to add variety and interest ; do not keep to one or two " sea-green " or blue colours ; try and make the model thoroughly characteristic of the actual scene under the conditions of wind and light, indicated by the ship and the backscene.

Take care that the direction of the wind and the light as indicated by the treatment of the backscene, accords with that of the sails and the waves.

Old-Time Ship Models.—Models of ships dating from mediæval times are required for scenic models representing the Middle Ages, not only for seascapes, but also in the appropriate setting of a navigable river scene.

Such models may be quite small as, for instance, that of Drake's ship, shown in Fig. 69, on a shilling-piece.

This model was made by the author ; the hull was whittled to shape from a slip of pine, the masts and yards from fine needles, the rigging was done with human hair and the sails and flags made of paper.

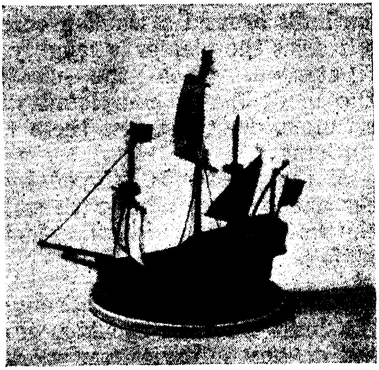

FIG. 69. MINIATURE MODEL OF DRAKE'S SHIP.

Hints on Plaster Modelling.—The following hints on the use of plaster-of-paris for scenic modelling are applicable to all classes of model when plaster can be utilized.

Ordinary builders' plaster will answer for rough work, but the best " Italian Superfine " is necessary for fine modelling.

Keep it bone dry and absolutely free from dust ; any foreign matter in the plaster will ruin it.

Mixing Plaster.—To mix plaster, put some slightly warm water into a bowl and gradually pour the plaster into it and stir all the while, in the same direction, with a wooden spoon. Avoid air bubbles, use the liquid plaster in a creamy state, work quickly as the plaster sets or hardens in a few minutes.

When pouring plaster into a mould, run it in slowly, gently, but continuously to avoid air bubbles.

Large objects can be left hollow, by filling the mould, leaving it for a few minutes and pouring out the surplus plaster. Alternatively the cavities can be cast in by the use of " cores " in the usual way.

External Modelling on Plaster.—A mass of liquid plaster may be built around a wooden core, on a base-board, and as it dries the plaster is roughly shaped with the hands. Later on, when the plaster has set sufficiently, the modelling is completed with ordinary clay modellers' tools, or others like them extemporized for the work in hand.

The drying of the plaster is delayed by covering it with wet cloths and by sprinkling with water. A little glycerine in the water with which the plaster is mixed, retards the setting.

Roughly Modelled Surfaces.—Large, roughly modelled surfaces can be built up with sacking, or anything of that kind, fixed on any suitable framework of wood or metal, and the whole brushed over with rather " sloppy " plaster.

This is followed by the addition of masses of moist plaster thrown on to the base with some violence.

Finish the whole surface at the same time as wet plaster cannot be successfully added to dry work. Should it be necessary to build up some parts with further masses of plaster, leave a " key " or rough part for the new plaster to grip.

Finally, go over the surface with a brush well charged with liquid plaster, and complete the modelling.

Carving Dry Plaster Casts.—Dry plaster casts can be carved with the same tools as used for wood-carving. Plaster will show remarkably fine detail, and on small work much can be done with ordinary needles, or with suitably shaped pocket-knife blades.

Moulds made of plaster are used for making plaster casts, but to prevent the new plaster sticking, the surfaces should be covered with white vaseline, which can also be used to grease the surfaces of any small article from which a mould is to be taken.

CHAPTER IX

Bridges and Civil Engineering

BRIDGE-BUILDERS are often looked upon as pioneers of civilization; certainly their work in the wild places of the earth has been the beginning of a wonderful development and expansion of trade.

The builder of bridges has to overcome almost unheard of difficulties, to span impassable rivers, and throw a safe pathway across a vast ravine.

Consequently, a scenic model has in most cases to picture the bridge as a slender thing of steel, audaciously challenging the impenetrable fastnesses of nature at her wildest.

Building a Simple Model Bridge.—One of the simplest and easiest types of bridge to model is that known as a plate or box girder overbridge, such as the example in Fig. 70. Such bridges consist of flat plates of steel riveted together and stiffened by webs and angles. They are easily represented by a long strip of thin wood,

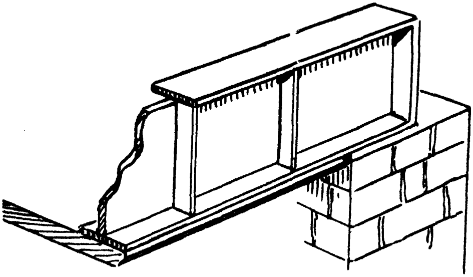

FIG. 70. DIAGRAM OF A PLATE GIRDER BRIDGE.

faced with narrow vertical pieces to represent the angles and capped by horizontal strips of thin wood.

The roadway is a piece of thin, flat board fixed to the bridge girders as shown in Fig. 70, and the whole rests upon brick or masonry piers at each end of the bridge.

This type of bridge is suitable for a railway bridging a roadway or canal.

Longer bridges are often of the suspension type such as that sketched in the diagram in Fig. 71.

Suspension Bridges.—There is no need to discuss here the relative merits of the various bridge types ; suffice it to say, that a suspension bridge consists of the land arches and anchorages *A*, Fig. 71, the supporting piers *B*, and main cables *C*, which are fastened to the abutments and supported by the piers.

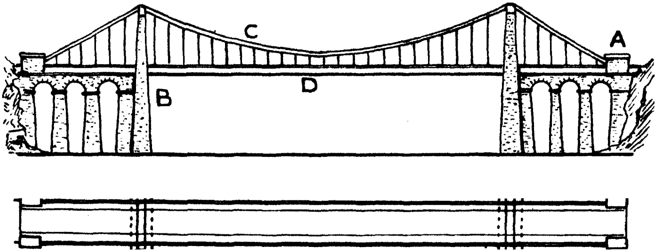

FIG. 71. ELEVATION OF A SUSPENSION BRIDGE.

The roadway *D* is suspended from the main cables by a series of vertical bars or " ropes."

Building the Land Arches.—The land arches can be built of wood or card arranged as shown in Fig. 72, which is a partly sectioned view and should make clear the disposition of the parts.

The piers, Fig. 73, are made in a similar way, but are much taller and must have a clear passage-way through them corresponding in width to the roadway.

The roadway may be one long, flat strip of wood, edged with vertical pieces to represent the parapets or railings and must have a series of holes drilled near each edge to take the lower ends of the suspension ropes.

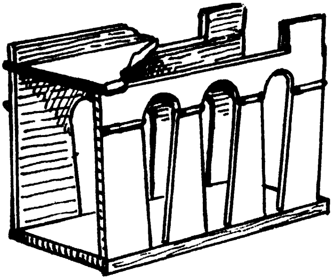

Fig. 72. A Land Arch, in Part Section.

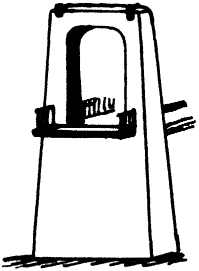

Fig. 73. One of the Main Piers.

Main Cable and Ropes.—The suspension ropes can be made from pieces of wire or, when possible, of small diameter hardwood. The lower end fits into the hole in the roadway, the upper end into a slot cut in the centre link, or between the inner pair of links of which the main cable is composed.

The main cable is a series of flat wooden or cardboard strips arranged in series of threes, and twos, fastened together by a rivet, as shown in Fig. 74, which should give a good impression of the general mode of construction.

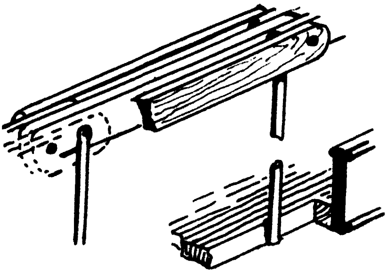

Fig. 74. Method of Suspending the Roadway.

Cantilever Bridge.—A simple method of modelling a cantilever bridge such as that in Fig. 75, is to make the roadway from a single strip of wood. The side girders are made from strip wood with thin rods to represent the tension bars. The whole of the side girders can be built up on the edge of the roadway, while the latter is temporarily nailed to the front edge of the bench.

The suspension members and other elements are laid flat on the surface of the bench, and all joints made with tiny nails and adhesive; thus the troubles of vertical assembly are avoided.

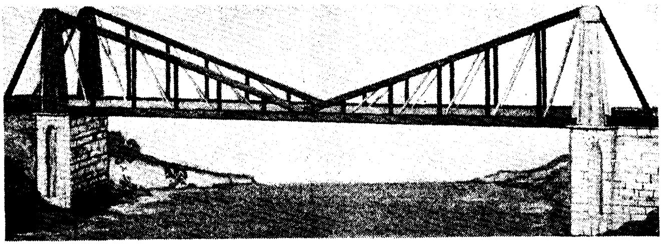

Fig. 75. A Simple Cantilever Bridge.

The four separate pylons are built up from thin wood, or stout cardboard. The bridge element is then painted. The abutments are built up like a box, the whole fixed in position and the earth embankments and scenic effects completed.

Lattice Girder Bridges.—Lattice girder bridges and all those which are similarly built of angle and other sectional steel bars are very attractive as prototypes for a scenic model.

Within reason, almost any size scenic model of such bridges can be satisfactorily built with strips of cardboard, and with angle and tee pieces of the same material.

Building a Lattice Girder.—A lattice or braced girder bridge of simple type is shown in Fig. 76, and some details of construction in Fig. 77.

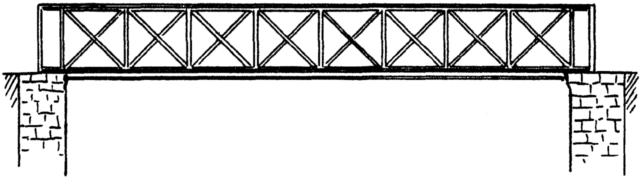

FIG. 76. BRACED GIRDER BRIDGE.

A lattice girder is a structural unit composed of horizontal members connected together by perpendicular and angular members to form a built-up girder.

Models can be made with correctly sectioned metal strips, or with wood, card or other material, according to circumstances.

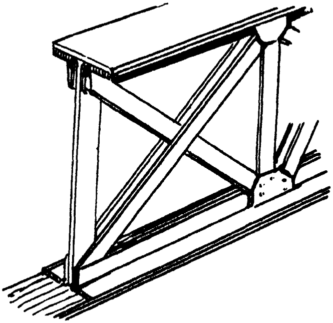

FIG. 77. DETAIL OF CONSTRUCTION OF A GIRDER.

Building a Bridge with Cardboard.—The angle bars are made by cutting strips of card of the required length and width, scoring them along the centre and bending the flanges at right-angles ; the other parts are all cut from the flat strips.

To assemble such a girder, lay the angle bars flat on a full-size outline diagram and hold them in place with pins, add the vertical members, and fastening them with adhesive.

A few fine pins can be driven through from the face side to represent rivet heads, or they can be punched up with the aid of a hollow-ended punch.

Civil Engineering.—Scope for the scenic modeller in the realms of civil engineering is to some extent limited by the nature of the subjects, as they do not often lend themselves to sufficient breadth of treatment.

Model of a Distillery.—Consider, for instance, a large model of a distillery such as that made by Messrs Bassett-Lowke, Ltd., and exhibited at the British Empire Exhibition.

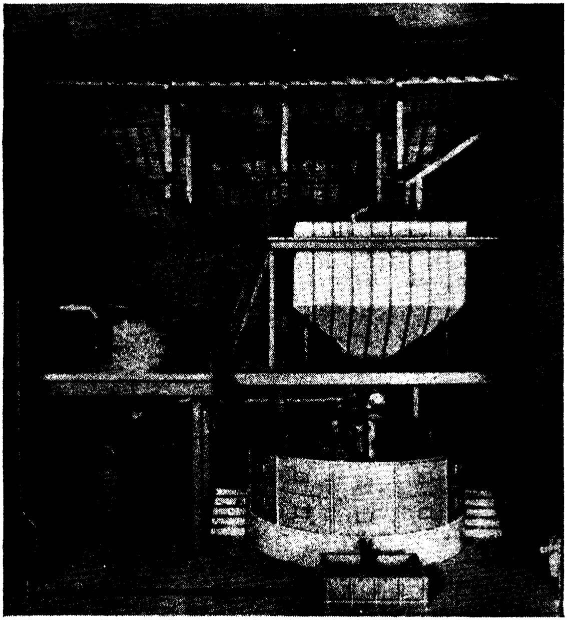

FIG. 78. PART OF A MODEL DISTILLERY, BY BASSETT-LOWKE, LTD.

A small section of this model is shown in Fig. 78, and suffices to indicate the general treatment. This class of model has really to be built to scale, and as the elements of almost all machines are comparatively small, it follows that the craftsman must be capable of fine metal work.

Scenic Model Tin Mine.—The subject matter of Fig. 79 is a Tin Mine in Nigeria. The model illustrated, which is exhibited in the Imperial Institute, London, may be taken as typical of a large variety of mining subjects which can be treated in the same way.

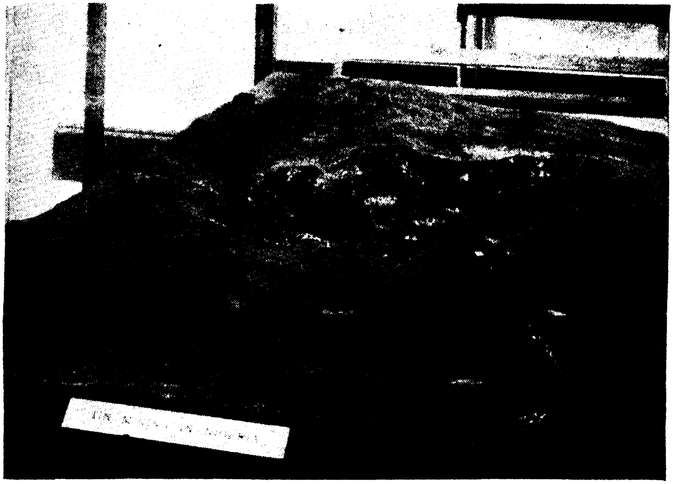

FIG. 79. MODEL OF A TIN MINE IN NIGERIA.

Actually the model measures some 6 ft. by 3 ft., but large as it is, the scale is small and the details can only be seen by a very close inspection.

Models of this general type can all be made by the methods already described in this book.

A wooden base supports the contoured strips to which the canvas is nailed. The canvas is impregnated and covered with plaster and duly modelled.

The buildings are built up with card and the engineering features represented by fine wire and strip metal, properly arranged and soldered together.

Sectional Model Refuse Destructor.—Another large group of quasi-scenic models are of the general type illustrated in Fig. 80, which is a particularly fine representation of an up-to-date refuse destructor built by Messrs. Heenan and Froude, Ltd., of Worcester, England.

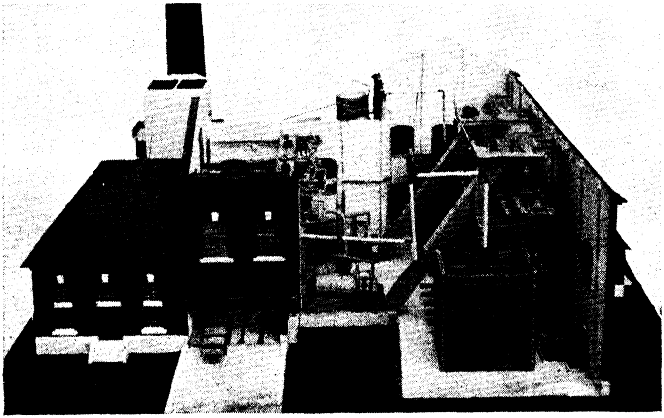

Fig. 80. Sectional Model of a Refuse Destructor at Zurich.

The architectural features can be built in wood along the lines described in Chapter VI, but the machinery has to be dealt with in divers ways according to its nature and shape.

Much can be done with Bristol board, building the parts piece by piece. Others can be carved from solid pieces of lime wood, while others can only be represented with metal.

CHAPTER X

Scenic Models of Machinery

REMARKS in the previous chapter concerning the difficulties of representing civil engineering works, by other than a true scale model, apply equally to the modelling of machinery.

Readers who seek information on the construction of accurate scale models, or practical working models of machinery, should study "Model Engineering," by

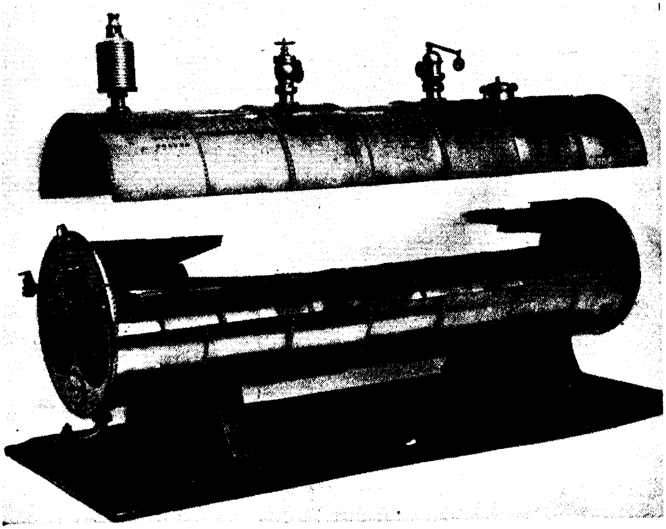

FIG. 81. GALLOWAY BOILER IN PART SECTION.

H. Greenly, published at 6s. net, by Cassell & Co., Ltd.

On the other hand it must be admitted that scenic methods can be applied to machinery models, often with considerable success.

Sectional Model of Galloway Boiler.—The model of a Galloway boiler, seen in Fig. 81, gives a graphic representation of the original, because the upper part of the boiler shell is removable, and other portions are shown broken away to reveal the internal details.

Copper and brass are the materials employed in the construction of this model, which is illustrated by courtesy of the makers, Messrs. Galloway, Ltd.

Gas-purifying Works.—Gas is such a valuable aid to modern comfort, that a model shown in Fig. 82, depicting some of the elaborate apparatus used to ensure its quality and purity, should be of general interest.

This model is exhibited in the Science Museum, South Kensington, London, and is reproduced by courtesy of the director.

Before any such model can be made—in any form—it is imperative to have access to the proper working drawings of the original; or, at least, all those which are necessary to provide full information about every external and visible detail.

Importance of Accurate Drawings.—Analysis of the drawings is aided by inspection of, and comparison with, some photographs of the appliances.

It will soon be realized that even such an elaborate model as that in Fig. 82, can be resolved into a series of simple elements, the construction of which is relatively straightforward.

All the pipes can obviously be made of thin brass tube or of wood, the cylindrical tanks and suchlike can easily be made with cardboard tube and the flanges and ridges represented by narrow bands of card glued to the tube.

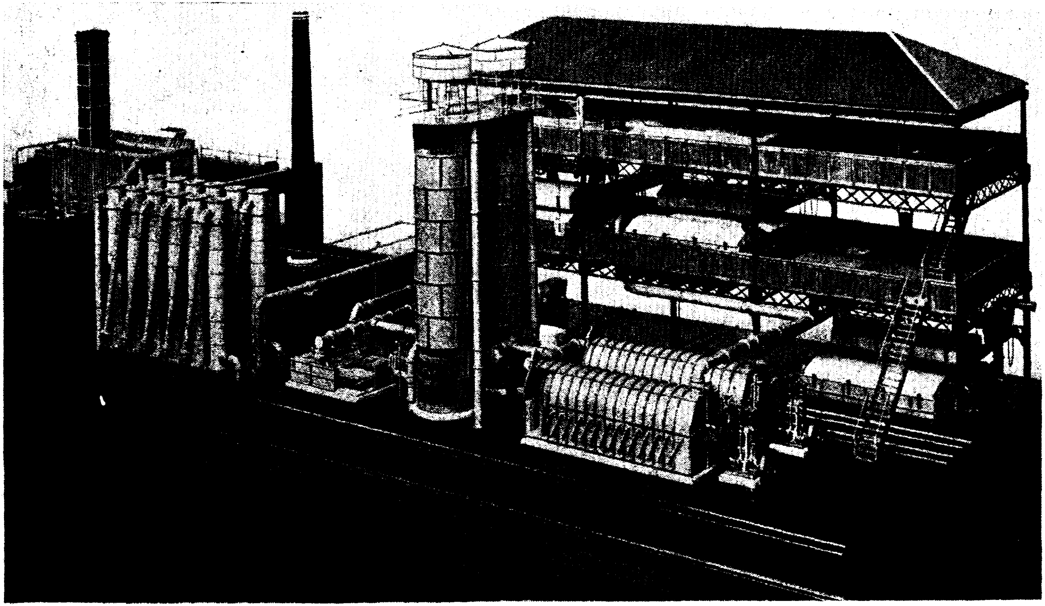

FIG. 82. MODEL OF A GAS-PURIFYING WORKS.

The round-topped machines in the foreground can be made by similar methods to those for a small house, while the lattice girders and structural steel parts are treated on the lines described in Chapter IX for the building of bridges.

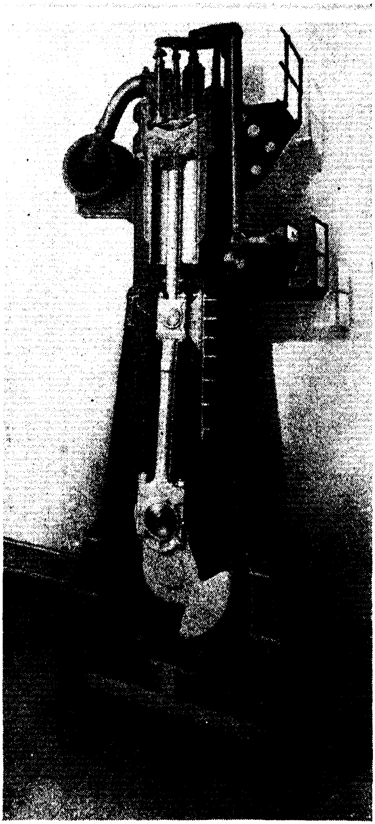

FIG. 83. WORKING SECTIONAL MODEL OF DIESEL MOTOR ENGINE.

Machined Parts.—Small steam engines and the like can only be made satisfactorily in metal—brass is the most useful metal for general work—and by the methods adopted by the model engineer.

Some parts of a non-working model engine can be turned from hardwood; in this category are cylinders, turbine cases and other circular parts.

Engine standards and bed-plates can either be built up or carved from solid wood.

Working Sectional Models.—Advertisers and others are often desirous of showing the working of the internal parts of a machine, and in such cases the scenic modeller can show his skill.

An admirable example is the working model Diesel engine shown in Fig. 83, and reproduced by courtesy of the makers, Messrs. Burmeister and Wain, of Copenhagen.

The model is constructed to a scale of one-fifth full-size, and is built of steel plate, and painted to represent the type of metal employed, the various oil and water spaces and circuits being differently coloured.

Electrically Illuminated Firing.—The section through the cylinder head and liner enables the timing of the valves to be clearly shown, and a semblance of reality is added by the automatic clanging of a small pair of cymbals at the point of firing, and the simultaneous illumination of the combustion space by an electric lamp, which causes a red glow behind a celluloid window in the upper part of the cylinder wall.

Railway Models.—Volumes have been written on the building and working of railway models, particularly those by Mr. H. Greenly, A.I.Loco.E., in Cassell's "Model" series, priced at 6s. and entitled "Model Electric Locomotives and Railways," and "Model Steam Locomotives," to which all interested readers are referred.

Some remarks about scenic effects on railway models in general may not, however, be out of place.

Post Office Underground Railway.—A model of an underground tube railway built by the G.P.O. for carrying mails and parcels between the G.P.O. and the principal main line terminal stations in London, is shown in Fig. 84. It was built by Messrs Bassett-Lowke, Ltd., and exhibited at the British Empire Exhibition.

It is a working model and represents a section of the tunnels and station, also part of the main line extending to other stations and disappearing under the London clay at each end of the model.

The station is complete with platform, hoists, elevators for parcel traffic, bucket elevator for mail-bags, and spiral shutes for delivery of mail-bags from the sorting-room to the platform.

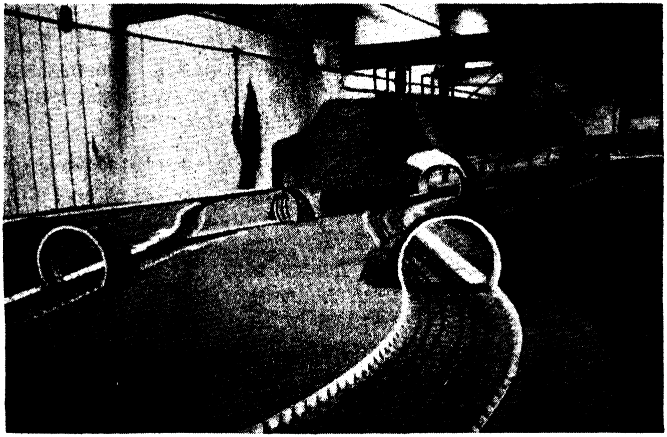

FIG. 84. POST OFFICE RAILWAY MODEL.

Skeleton Tunnels.—Two tunnels are shown with connecting passages between, and the sorting-room floor above the station.

The rolling stock consists of two complete trains, of three coaches each, which are scale reproductions of the actual trains.

Automatic Control.—The trains are controlled in the prototype from the stations, no driver or other person travelling with them. They are controlled from a cabin in one of the cross passages between the two tunnels and by the receiving station.

When the train arrives at the platform, the side doors of the coaches are opened and the mail-bags unloaded and shot down a small shute on to the travelling conveyor band, which carries the bags up to the end of the station, delivers them through a short cross conveyor band into the elevator buckets, and thence on to the sorting-room floor.

In the model the greater part of the tunnels and underground work is represented by short circular sections to simulate the "tube" in which the trains are worked.

Scenic Effects on Railway Models.—The best way to obtain satisfactory scenic effects on a railway model—when the working of the trains is a matter of paramount importance—is to lay all the track and then erect the principal stations and other buildings.

A model railway at this stage is illustrated in Fig. 85; part of another that has been completed is shown in Fig. 86.

After the principal features of the model are thus completed the scenic effects can be worked up in keeping.

Tunnels.—A tunnel is usually provided with a well-modelled front representing brick or stonework, and the space between them is roughly cased in with a wooden framework made of stiff batten.

This framework is then covered with stout brown paper, well glued together, and when dry a further addition of paper crumpled up to represent rockwork is added, or the whole painted to represent grass.

Another plan is to cover the framework with rough sacking, sprinkle it with water and then cover it all over with dilute plaster-of-paris and brush it well in with a stiff-bristled brush.

Add lumps of plaster here and there as requisite, and keep building up the surface with liquid plaster, the last few coats stained green, to give a grassy effect.

Small pieces of rock should be introduced in various places, also some hedges and trees, made as described in Chapter VII, to make the result very realistic.

Fences.—Fences of all kinds are extensively used on railway models. They may be represented in many ways. One method is to make a series of posts from square-sectioned wire, such as the 16-gauge tinned copper wire used in wireless work.

Place them the proper distance apart on a flat board

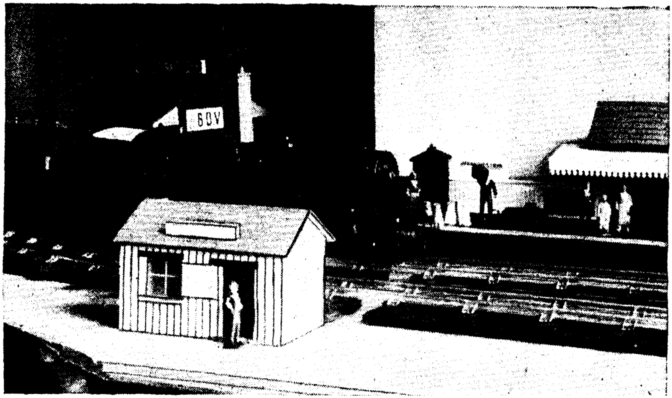

FIG. 85. MODEL RAILWAY DURING CONSTRUCTION.

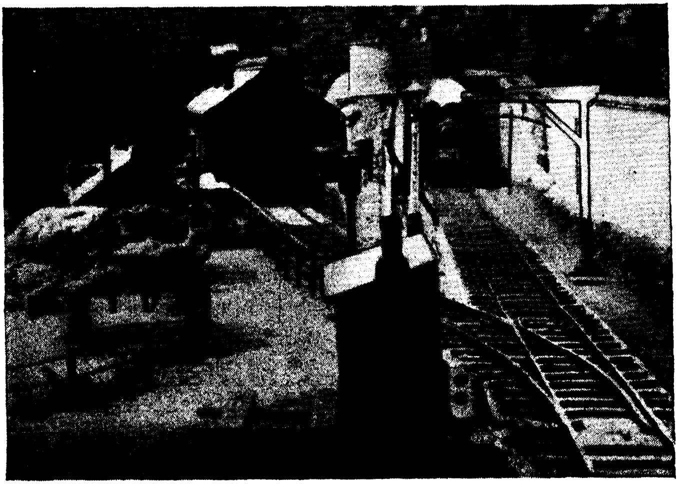

FIG. 86. SCENIC EFFECTS ON A SMALL MODEL RAILWAY.

and join them by round or flat pieces of metal soldered to the posts, and then erect them in place on the model. Other fences are made of fine twigs or separate pieces of dry grass gummed to horizontal wires or threads stretched between upright posts.

Very small fences can be represented by paintwork on the surface of a strip of a thin transparent material, such as celluloid.

General Remarks on Scenic Railways.—Be careful to use appropriate colour schemes. Brick walls should never be painted a uniform red, slates a uniform "slate," trees, shrubs and grass a standard shade of green, and so forth. Varieties of tone should be introduced, and then the result will doubtless be very convincing.

A staring white concrete bridge offends the critical eye; in real life it would bear obvious indications of the steam locomotives that pass beneath, and this appearance should be simulated on the model.

Most of the buildings, walls and other structures should have a weathered appearance.

Naturalistic Effects.—Kinks in rain-gutters, cracked windows in an old building, tumble-down fencing here and there, a portion of road "up" for repair, "A.A." sign-posts at a cross-road and little details of this kind are quite easy to carry out; and add enormously to the naturalistic effect of the whole model.

Regard the model as a picture, with the track and rolling stock as a part of it, and endeavour to make the scenic effects and backscene unite the whole in one cohesive composition.

CHAPTER XI

Figure Work

FIGURE-WORK, or the representation of the human figure, is one of the most fascinating aspects of scenic modelling.

Figure modelling may be carried out with such skill and artistry as to raise it to a veritable work of art, comparable to that of eminent sculptors.

Others may be content with the doll-like fidelity of the wax figure, which errs because of its mathematical exactitude and total lack of human expression.

Continental Work.—The French have been quick to realize and to express in their model-work that the real interest of any human being for another lies in expression.

It is not a matter of making a model that is an exact external counterpart of a real person, but rather it is that of giving expression to the character, the mentality, the human feelings or passions within.

The works of Imans and of Siegel in Paris are justly celebrated for their power of imparting human emotions to their figures. Their life-size models of the female form are unlike any real human being, but they convey in a marvellous way all manner of human emotions and expression.

One is indolence personified, another is whimsical, a third looks utterly bored, others are smiling, scornful, amazed, self-satisfied, or bewitching with their seductive allure.

Despite—or perhaps because of their expression—many of these models are painted in curious colours, pink, heliotrope, or primrose, or adorned with aluminium, silver or gold paints !

Importance of Expression.—Model work of this kind is only possible to craftsmen who are trained and skilled artists ; the novice must perforce have recourse to more ordinary methods, or to adapt a wax figure to their purpose.

Ready-made Figures.—Specialist firms supply ready-made figures, which can be adapted to almost every need of the scenic modeller.

There are in addition a large number of plaster casts of figures which can be painted or clothed in an appropriate way and incorporated into a scenic model.

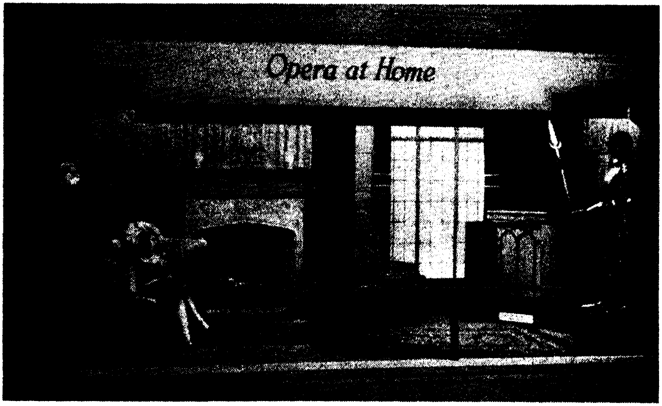

FIG. 87. THE LONELY LISTENER.

The illustration, Fig. 87, of a scenic window display by The Gramophone Co., Ltd., shows a solitary figure listening to the strains of grand opera, played by the instrument in the right-hand corner. Without the figure, the scene would be meaningless ; with it, there is a sensation of music filling a noble room with glorious harmony, most of this being due to the rapt expression on the face of the solitary listener.

Reminiscent of the Great War.—Messrs. Selfridge, Ltd., staged a remarkably effective scenic model, shown in Fig. 88, entitled " The Last Post." It represents a tense scene in the film of that name featuring John Longden in a remarkable dual rôle.

A splendid example of the use of large dolls and other figures—some in papier mâché—is given in Fig. 89, which is a modern interpretation of the good old nursery rhyme concerning the doings of the worthy dame who lived in a shoe.

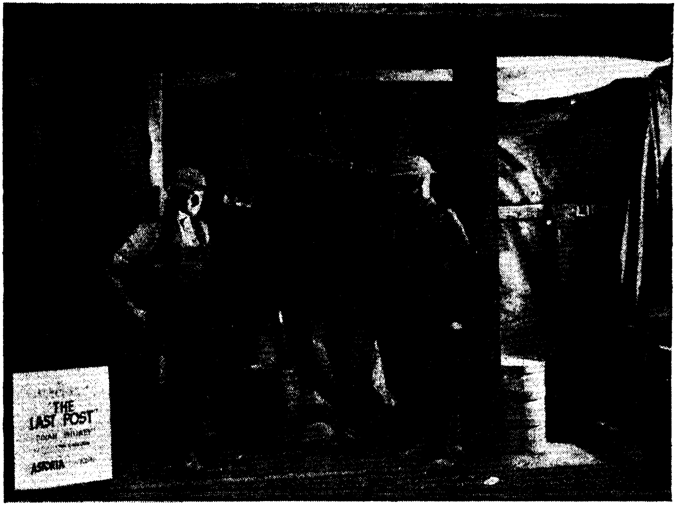

FIG. 88. THE " LAST POST."

Nursery Tales.—This scene was displayed in the windows of Messrs. Harrods, Ltd., in 1926, and is reproduced by their courtesy.

It is an admirable demonstration of the straightforward use of " stock " figures, set in suitable surroundings constructed and modelled in the customary manner.

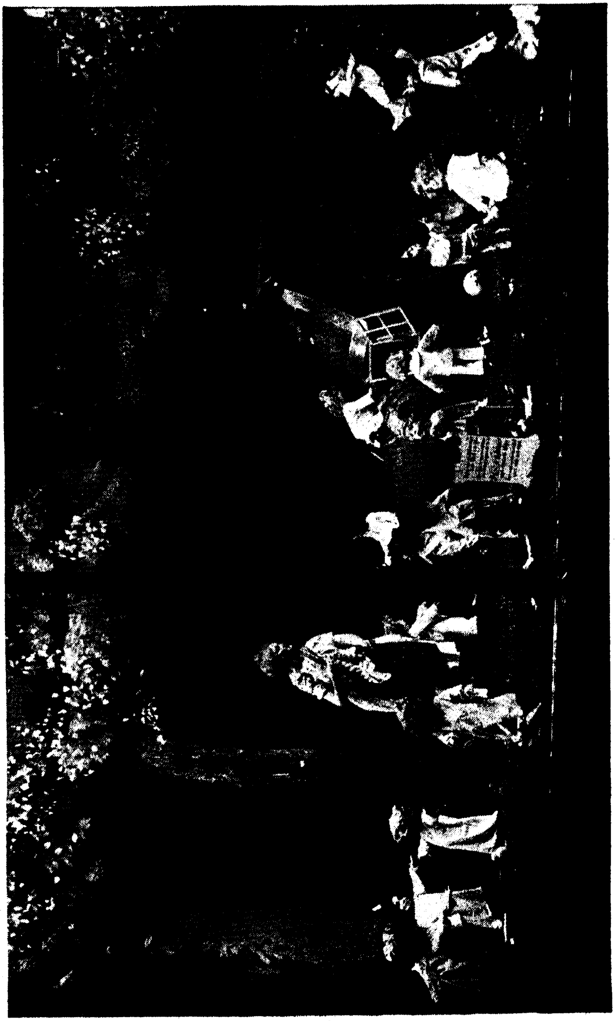

FIG. 89. THE "OLD WOMAN WHO LIVED IN A SHOE."

Combination of Modelled and Cut-out Figures.—A happy example of the combined use of cut-out and fully modelled figures is given in Fig. 90, representing a pause by the roadside to secure a few snapshots.

The Kodak Co., who staged this scenic model in one of their shop windows, have utilized a real car, some fully modelled figures, and a cut-out of the famous "Kodak Girl."

The whole is set before a backscene of rare attractiveness and high photographic quality.

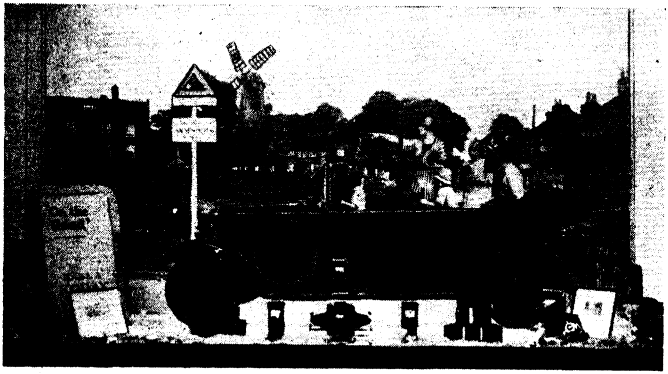

Fig. 90. A Kodak and a Car.

Papier Mâché Figures.—Papier mâché is a tough, durable substance made from paper pulp, or, in the commoner qualities, from waste paper mixed with other materials, such as ground chalk and clay, to form a fibrous composition.

Layers of a special quality of paper soaked in paste and glue, pressed into moulds, and, when dried, soaked in oil, is another form of papier mâché.

The material can be utilized by the novice by soaking ordinary newspaper in water mixed with a little diluted glue.

Plaster Moulds.—A replica of the desired shape is made in wax or plaster and a mould made from it in plaster-of-paris. After this has dried the moist paper is spread in the mould—which should previously have been well greased—and other layers of paper added until sufficient thickness is attained.

Strong paste is brushed on to the paper layer by layer and the whole allowed to dry.

The plaster moulds are then removed and the papier mâché allowed to dry and harden. It is subsequently painted or otherwise treated as circumstances demand.

Lead Figures.—Toy soldiers, farmyard animals, and the numerous small figures cast in lead that are now on the market, are so varied in subject, pose and size that they provide the scenic modeller with a storehouse of adaptable figures.

These figures include wild animals, natives, knights in armour, Red Indians, railway officials, airmen, passengers, sailors, race horses, huntsmen, hounds, and hundreds of other subjects.

They can often be used in the condition in which they are purchased, but it is frequently advantageous to repaint them with less garish colours.

Making Stuffed Figures.—Stuffed figures are comparatively easy to make. The first thing to do is to cut several pieces of material to the requisite shapes—for the arms, legs, body, and so forth.

The chosen material should be suited to the animal—for example, "coat plush" is admirable for a terrier dog, grey woolly materials for an elephant, fawn and brown cloth for a sleek hunting horse.

Cutting the Material.—Begin by laying the material flat upon a table and pin the patterns to it, then with pencil or coloured chalk, outline each piece half an inch bigger all round, to allow for turnings.

Cut out exactly on marked outline. The ears or other duplicate parts are cut from double material, thus making two similar pieces.

Sew the pieces firmly together, beginning on the longest and straightest edges, and have the face side of the material inwards.

Leave an unsewn gap at some convenient place, then turn the material right side outwards and proceed to stuff the figure.

Stuffing and Strengthening the Figure.—Use clean rags, bits of old wool or well-crumpled paper for stuffing, and pack it in as closely as possible. Cotton wool must be pushed right down into such parts as the nose and tail. Mould the body into shape as the work proceeds.

Odd pieces of wood can be used for the legs, which must all be the same size. Pad over each end of the wood with cotton wool, then wrap round wood with stuffing. Push legs in first very firmly, and pack stuffing all round them in body, and when it is entirely full, turn in edges of seam left open and sew up firmly.

These general methods are applicable to any kind of stuffed animal or figure, and are adaptable to those which will subsequently be clothed.

Modelling the Human Figure.—The body can be made on the above lines, and the face represented by a large doll's head or one of the numerous varieties of mask now on the market.

Alternatively, the face and head can be built up with sacking or wire gauze on a light wooden frame or basket.

This is covered with plaster as already described, and modelled in as realistic a manner as the skill of the worker permits.

Making Cut-out Figures.—All kinds of small cut-out figures can be made by outlining them on stout card, plywood, or other material and cutting it to shape.

The outlines can either be drawn on the material, or in some cases it may be better to paste a photograph or picture on to the wood.

An example of small fairy-like cut-out figures is given in Fig. 91. These are made of white Bristol board, outlined as described and cut to shape with scissors.

The face, neck, arms and legs are painted flesh-colour. The details of the features are painted black with a very fine brush, as also are the dots on edge of petticoat.

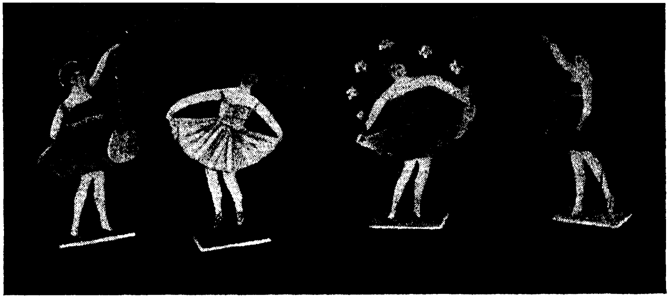

FIG. 91. SIMPLE CUT-OUT FIGURES.

Crepe Paper Clothing.—The dress is a small piece of crepe paper turned over at top, folded round the figure, and pasted into position at the back. A strip of crepe paper for the skirt is pleated, placed round the figure, and sewn round the waist; the edges of the skirt are then pasted neatly together.

A sash or belt can be made by passing four strands of silk round the top of the skirt, and then working them together in button-hole stitch.

The arch of roses consists of tinsel-covered wire to which tiny paper roses are sewn. A stand is made for each figure from a small piece of wood with two slits for the dancer's feet, which are then secured with gum.

CHAPTER XII

Mechanical Movements, Motive Power and Coin Mechanisms

NUMBERS of scenic models are provided with mechanical movements for the purpose of imparting life and action.

Anything approaching a complete survey of the subject would need a large volume ; the following notes are therefore intended as sign-posts for the enterprising model-maker, who must in every case adapt suitable mechanism to the purposes in hand.

Electric Motors.—By far the most convenient source of motive power is an electric motor. These can be supplied with current from the lighting or power mains, but small power motors, with a capacity of, say, 30 watts or less, can be run from accumulators or large dry batteries.

In all cases the needful fuses, switches and control gear should be placed in an easily accessible position, and all parts of the circuit should be most carefully insulated.

Clockwork Motors.—A clockwork mechanism is a prime mover utilizing the stored energy of a coiled spring. The only available energy is that put into it by the person who " winds it up." Such energy can be released very slowly, or very rapidly, as when driving small models when a little power is required for a short period.

Advantages are the absence of heat, silence of operation and convenience.

The springs are usually flat and made of a special grade of elastic tempered steel. They are like a long ribbon, one end attached to a driving spindle, the other anchored to an immovable part of the frame.

Ratchet and Pawl Device.—As the spring is coiled up, a ratchet and pawl prevents the winding spindle from moving backwards, and the stored energy is taken from the revolving member. In practice a large diameter gear wheel is attached to the movable member which gears with a small diameter pinion on a secondary shaft, which gears with the driving shaft of the mechanism.

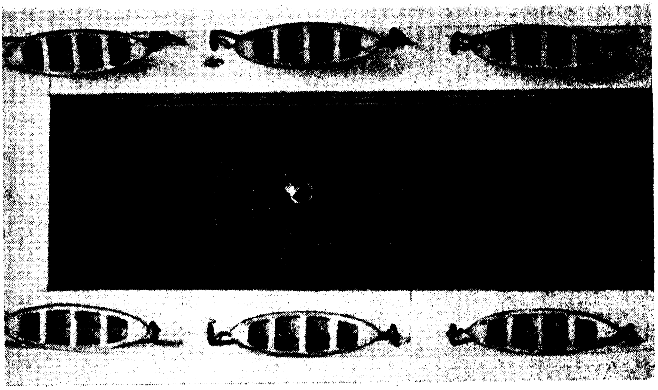

FIG. 92. CLOCKWORK MOTOR IN A MODEL BOAT.

Therefore the total number of possible turns is conditioned by the number of turns the spring can unwind before it is divested of energy.

The power can be transmitted in any convenient direction by the use of bevel, mitre or skew gears. Uniformity of revolution is ensured by means of a centrifugal or other governor.

The steady drop in the energy output is one of the greatest defects of many clockwork mechanisms.

An example of a small clockwork motor in a model boat is given in Fig. 92.

Sand Motors.—A sand motor is like a water wheel, because the energy is obtained from the falling sand striking against the blades of a wheel and causing it to revolve.

The wheel is mounted on a steel shaft turning in simple brass bearings and the drive is taken from a small pulley on the shaft.

Such a device generates sufficient power to drive the average small working model.

Water Wheels.—There are several kinds of water wheel, including the undershot and the impulse; the latter is the more efficient.

A moving column of water strikes a bucket attached to the rim of a wheel, the momentum of the water tends to move the wheel away from the jet. As the wheel revolves other buckets are brought into the area of action of the jet, and consequently the wheel revolves smoothly and regularly at a high rate of speed.

A wheel 6 in. in diameter supplied with water at 40 lbs. pressure or the usual household supply service will generate about ¼ h.p. of energy.

Transmission of Power.—The rotary motion of the motor is transmitted by belts, chains or gear wheels to a " motion " shaft, on which are mounted the various pullies whence belts are taken to the various working parts of the model.

Cranks, cams and eccentrics, in conjunction with suitable connecting rods or cords, can impart reciprocating or backwards and forwards movements as requisite.

Timed Movements.—A series of motions can be imparted to a mechanical device by means of a large diameter, slowly-rotating drum having upon its surface a series of cams. These cause fingers or rods normally resting on the drum to lift or move under the influence of the cam, and these motions are transmitted by rods to the model.

Coin Mechanisms.—Exhibition models are often provided with mechanism which can only be set in motion by the insertion of a coin.

Some of the best-known models of this kind are to be seen in Parson's Galleries, 315, Oxford Street, London, where upwards of £20,000 has been collected in this way for the War Seal Foundation—an organization working for the benefit of ex-service men.

One of the models at this exhibition, shown in Fig. 93, has been loaned by the owner, H.R.H. the Duke of York. It is an exquisite model of a surface condensing marine engine, and it has collected over 60,000 pennies, and showed appreciation by responding every time a penny was placed in the slot.

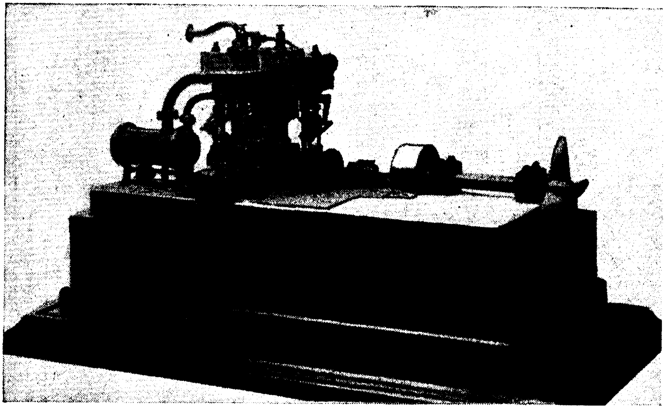

FIG. 93. ONE OF H.R.H. THE DUKE OF YORK'S MODELS.

Typical Coin Mechanism.—A simple coin mechanism is illustrated in Fig. 94. A coin inserted in the slot *A* falls through a trough and is stopped by a contact blade *B* and a pivoted lever *C*. The coin closes an electric circuit from the accumulator *D* and sets the motor *E* in motion, which drives a shaft *G* through the gearing *F*. The shaft is coupled to the model to be driven, which is thereby set in motion.

Automatic Stopping Device.—To stop the mechanism a flat chain running on a small sprocket on the driving shaft and over an idler sprocket on bearings *H* carries a stop-peg *J* which engages the lever *C*, raises it, and thereby releases the coin which falls into the till *T*, and thus stops the mechanism, as the circuit is broken.

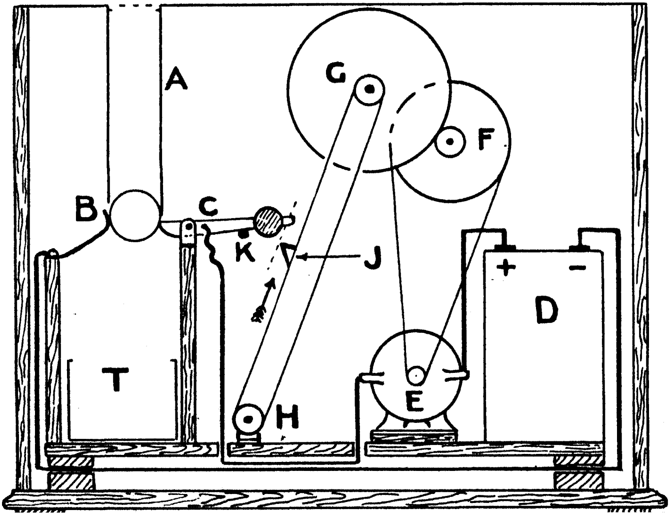

Fig. 94. Coin-actuated Mechanism.

The lever *C* is counter-weighted so that when the coin drops, the weight of the long end is sufficient to bring it to rest on a stop-peg *K*.

When the coin drops, the lever rises above the catch *J*, and when another coin is inserted the circuit is again closed and the cycle of operations repeated.

Simulating the Motions of Waves.—The motion of the waves of the sea is difficult to reproduce effectively.

One method is to cover the surface of the "sea" with painted canvas securely attached to the upstanding edges of the baseboard. A series of rocker arms are disposed at suitable intervals below the canvas, but so that it can sag between them; one end of the rocker is pivoted to the base, the other end is raised or lowered by means of simple cams attached to an endless leather band travelling across the base of the model.

The band is driven by a flat-faced pulley at one end and runs over an idler pulley at the other end.

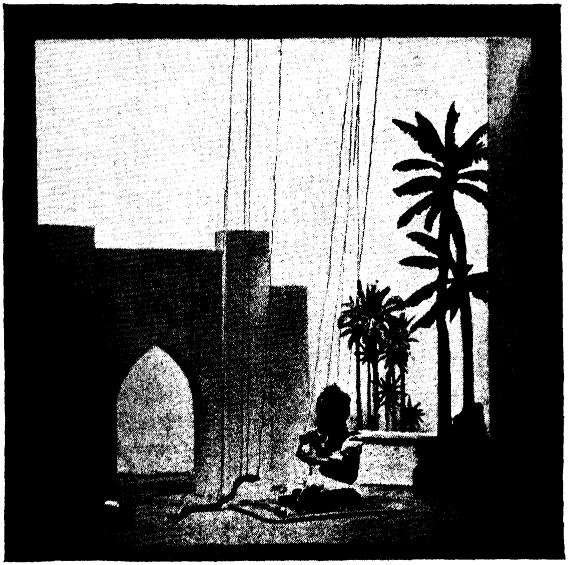

FIG. 95. THE "SNAKE CHARMER," BY H. W. WHANSLOW.

Jointed Figures.—The motions of jointed figures, such as those used in marionette shows, can be mechanically actuated by fine silk threads. An example of this kind is the "Snake Charmer" seen in Fig. 95.

Fine silks are attached to all necessary limbs and parts of the figure. These silks are then led upwards and out of sight, where they can be fixed to rings or bushes on a simple multi-throw crankshaft. As this crankshaft revolves the strings are raised or lowered in sequence and regular motions are imparted to the figure.

Vehicular Traffic on Roads.—Models showing a busy street scene with vehicles in motion are generally actuated by endless bands to which the vehicles are suitably connected.

Another plan is to use a moving magnet, or series of magnets, below the surface and to provide a piece of soft iron on each vehicle. They are thereby compelled to follow the motions of the magnets.

CHAPTER XIII

Electrical Devices

THIS chapter deals very briefly with some of the many electrical devices that are so useful on many scenic models.

The construction and operation of such devices are dealt with in other volumes of the "Amateur Mechanic and Work" series, particularly "Electric Accumulators," "Electric Bells," "Electric Clocks," "Electric Lighting," "Small Electric Apparatus," "Small Dynamos," and others—all priced at 1s. 6d. nett each.

Electric Motors.—These should be as silent running as possible, very well made, particularly as regards the windings and the commutator and brush gear.

The latter should be easily accessible for cleaning. Ring oiling or other reliable means of continued lubrications are essential.

Electric Accumulators.—Accumulators should always be quite large enough for their purpose, well and solidly made, and should be normally stored in an acid-proof case. Ample ventilation is highly desirable, as the fumes from an accumulator may discolour a model or do other damage.

Means of re-charging must be provided, or the accumulators so disposed that they can be removed quickly and replaced.

Terminal nuts ought to be substantial and all the electric conductors which are coupled to them should have proper tags or terminal ends.

Electric Switches.—Every main circuit should have a double-pole main switch of ample capacity, this being provided to enable the whole of the electric power to be cut off when necessary.

For most model work a 5-amp. or 10-amp. double-pole tumbler switch, or a D.P. knife switch in cast-iron case, will answer admirably.

Making a Simple Switch.—Simple switches for low voltage work can be made as shown in Fig. 96. It is a single-pole switch; the lead from the battery, or power side of the circuit, is shown at *A* and that leading to the electrical device at *B*.

The circuit is completed when the lever *C* is lowered, as shown, and it is broken when the lever is moved out of contact.

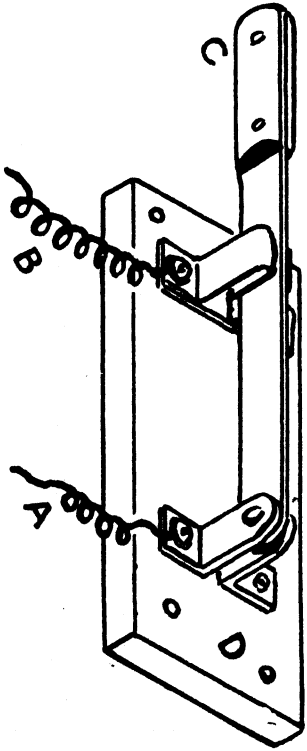

FIG. 96. DIAGRAM OF A SIMPLE SWITCH.

Making the Switch-base.—Several of these switches can be connected together, side by side, connecting any or all of the levers by an insulated bar or handle. Convenient sizes for the switch-base *D* are: 2 ins. long, $1\frac{1}{8}$ in. wide and $\frac{1}{4}$ in. thick; the best material being ebonite. The contacts are made from hard sheet copper $\frac{3}{16}$ in. wide and $\frac{1}{32}$ in. thick, bent to an L-shape, the lower arm pierced for a fixing screw with round head screwed into a tapped hole in the ebonite base.

The other arm is bent over sharply and doubled back on itself. Four of these contacts are made and fixed in pairs, as shown. The lever is a piece of strip brass $2\frac{1}{4}$ ins. long, $\frac{3}{16}$ in. wide, and $\frac{1}{16}$ in. thick, with an ebonite handle at one end, rounded and drilled with a $\frac{1}{16}$ in. diameter hole at the other, and pivoted between a pair of L-shaped brackets with a stout brass rivet.

The brackets should be bent to shape from brass strip $\frac{3}{16}$ in. wide and $\frac{1}{16}$ in. thick, and screwed to the base.

Electrical Switchboard.—A switchboard should be provided when a number of switches are needed—for manual operation from the exterior of a model.

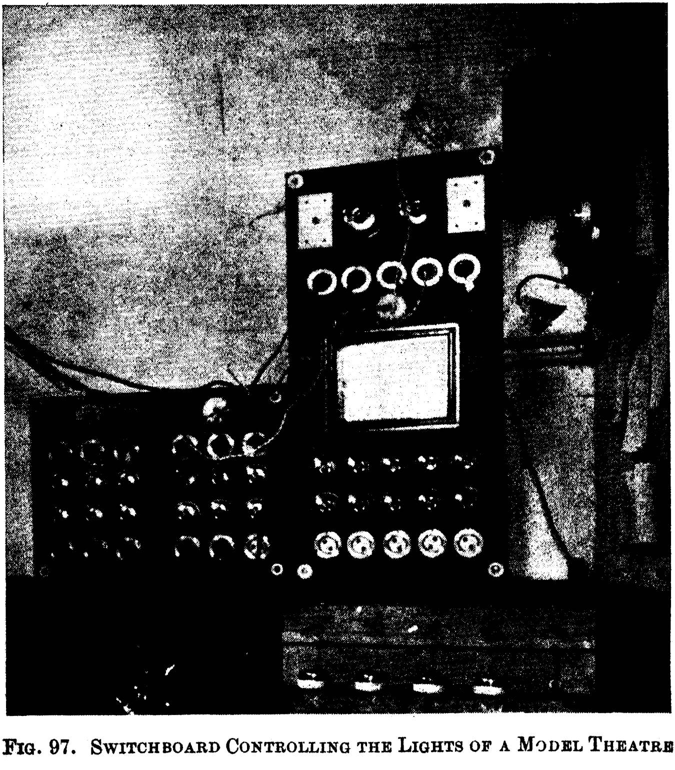

Fig. 97. Switchboard Controlling the Lights of a Model Theatre.

The board can be of dry hardwood when using low voltages—not over 4 or 6 volts, but of ebonite or slate when of higher voltage.

The various switches are grouped on the board and the leads taken to the appropriate places. An example is given in Fig. 97, showing the switchboards controlling an elaborate lighting system for a model theatre.

Regulating the Voltage.—The usual means of regulating the voltage of devices used in scenic models is by means of a simple resistance switch.

For small voltage changes the slider type of variable resistance is the best, but for more definite changes a " stud " type of resistance is to be preferred.

A usual pattern of stud resistance consists of a frame with insulated bars, between which a series of resistance wires are coiled. Each resistance is tapped off to a stud and contact is made to any of them by moving a contact arm.

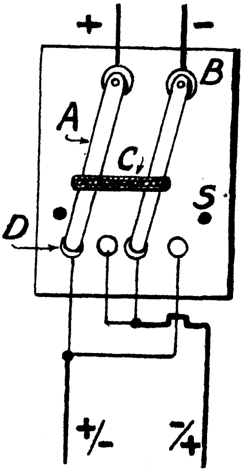

FIG. 98. CIRCUIT DIAGRAM OF A REVERSING SWITCH.

Reversing Switches.—A reversing switch is used when the polarity of the current in one part of a circuit has to be changed without disconnecting any of the wires.

The usual circuit connections to a simple double-pole single-throw switch are given in Fig. 98. Two spring brass strips *A* are pivoted at the terminal points *B*, and linked together by a cross-piece of insulating material such as hardwood or ebonite at *C*.

Four Fixed Contacts.—Four brass contact studs are provided at *D*, spaced at the same centre distance as the brass strips. Stop-pins *S* limit the traverse, and the incoming side of the circuit is shown at the top of the diagram and connects to the terminal points of the pivoted strips.

Reversal of polarity on the lower or outgoing side is obtained by switching over the levers from one pair of contact studs to the other.

Electric Relay.—Relays are used for various purposes, but chiefly in connexion with a feeble incoming current which is insufficient to actuate the desired piece of apparatus.

The function of the relay is to respond to the feeble current and close a switch in a strong local circuit.

The usual arrangement is shown diagrammatically in Fig. 99, where *A* shows the incoming circuit leads.

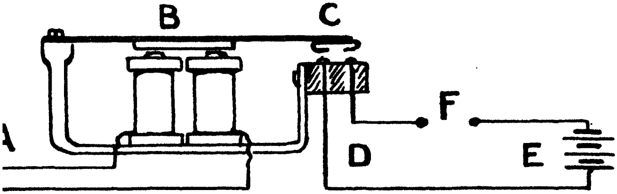

FIG. 99. CIRCUIT DIAGRAM OF A RELAY.

Electro-magnetic Relay.—The electro-magnetic relay is like an ordinary electric bell in its action. Its sensitivity depends partly upon the winding of the electro-magnets and partly upon the freedom with which the moving armature *B* is attached.

The armature carries an extension piece with a contact plate, preferably tipped with silver, which bridges across a pair of contact points *C*, in the local circuit *D*, with a battery at *E* and the electrical device in the circuit as at *F* when the armature is pulled towards the magnet. If the bobbins are wound with a large number of turns of fine wire the relay can be operated by a few cells situated at a considerable distance away and used for starting or stopping motors, or other devices in the local circuit.

Solenoids.—A solenoid is a form of electro-magnet and consists of an iron core, free to move within a coil of fine insulated wire wound on a wooden or other bobbin. When an electric current flows through the coil the iron core is attracted, and a pull can be exerted by it through a wire or cord attached to the part to be moved.

Electric Flashers.—Automatic devices used in an electric circuit, where a lamp or lamps in the circuit are illuminated intermittently.

The flasher has some applications to scenic model-work—for example, when simulating the flashes of lightning on a stormy night, or the intermittent illumination of a lighthouse.

CHAPTER XIV

Lighting Effects

EFFICIENT lighting plays a most important part in the spectacular beauty of a diorama or any type of enclosed scenic model.

Furthermore, the use of coloured lights, changing lights, moving bands of lights, and other schemes of illumination can often be utilized in such a way as to impart definite qualities to the scene.

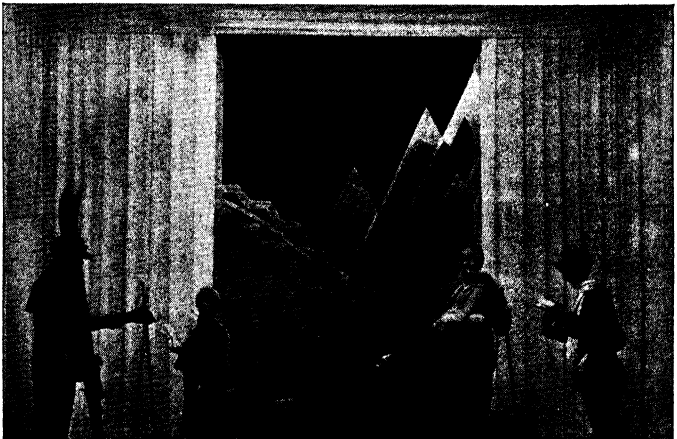

FIG. 100. ALPINE SPORTS WINDOW DISPLAY.

Lighting Arrangement Compared.—Roughly speaking, all lighting effects can be grouped into a few distinct headings. Firstly, there is "flood," or shadowless, lighting, largely used in window displays, such as that in Fig. 100, which depicts necessary clothing and accoutrement for Alpine sports.

Messrs. Selfridge, Ltd., have in this display concentrated the interest on futuristic models of the Alps, and illuminated the whole scene in a remarkably uniform and shadowless manner.

The bulk of the light is from above, with other concealed lights at the sides, hence the uniformity.

Concealed Lighting.—Enclosed scenic models and dioramas are preferably illuminated by "strip" lights concealed behind the proscenium or front of the case, and by other lights at the top.

The value of these lights should be adjusted in such a way that the shadows cast by one group are obliterated by the other groups of lights.

Emphasis can be given to certain points by the use of concentrated lights localized behind a tree or other convenient object which will conceal the light from the eyes of the spectators.

Importance of Ventilation.—The adequate ventilation of a model containing a number of electric lights is most important. It is conveniently secured by the provision of an inlet hole at the bottom and larger outlet holes at the top.

These should have dust-trays or bafflers below them to check the ingress of dust and dirt.

Internal Illumination of Small Models.—Small open or scenic models, particularly those representing a small building as seen at night and illuminated from within, can be lit up by one or two small electric bulbs in the base of the model.

An example is given in Fig. 101, showing the white reflector and the electric bulb in the base of the model, and the aperture cut in the cover board.

This opening registers with the site for the building, which is made hollow so that the light within may shine through the neatly glazed windows.

Day and Night Effects.—Combinations of internal and external lights enable a model to be viewed as it would appear by day and by night.

Similarly by providing a number of red and yellow lights and a suitable switching system, the aspect of the model can be varied from that of noonday sunshine to a sunset effect, and this followed by a vision of the same by moonlight.

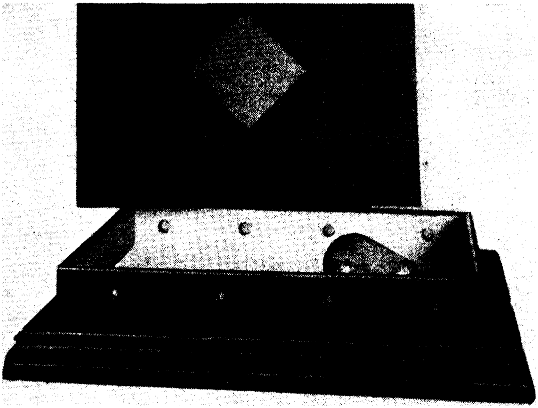

FIG. 101. BASE AND LAMP FOR AN ILLUMINATED MODEL.

Automatic Switching.—These effects are readily obtained by providing the requisite number of separate circuits and taking them out to convenient control switches.

These can be worked by hand—as from the switchboard in Fig. 97, Chapter XIII—or by an automatic switch, driven electrically, or from some convenient part of the model if the latter is provided with mechanical movements.

Running Water Effects.—Models of waterfalls, running streams, and others representing moving water can be illuminated by changing and moving coloured lights.

The effects are possible in two optical ways. In one group the lights are projected on to a white or lightly coloured reflecting scene, shaped and modelled to represent the water. This is known as the reflected light system, and is the same in principle as a magic lantern display.

Transmitted Light Effects.—If the water is represented by ground glass or any suitable translucent glass with like qualities, the lights can be thrown upon it from the back and are seen through the glass—this is known as the transmitted light method.

The sensation of motion can be imparted in several ways, one method is to use a rotating cylinder of multi-coloured glass with an electric bulb in the centre.

As the light is thrown on the screen (or through the glass) it appears to travel along.

Fixed Light Systems.—Another plan is to use a rotating disc of coloured glass and project a beam of light through it on to the screen. Two or more of such discs can be used, and be run at different speeds or in different directions; they then yield an effect of turbulent motion.

These effects are generally known as fixed light systems, as the bulbs are fixed and the light is continuous.

Moving Light System.—Another plan that may be adopted is to arrange a large number of small lights behind a sheet of translucent glass—representing the water—and to illuminate it progressively.

This is accomplished by a mechanical or self-acting electric switch which progressively switches off a row of the lights.

The light is only momentarily interrupted, but this takes place row by row in regular sequence. This gives a marvellous impression of steady motion to the water and in conjunction with good paintwork on the glass itself, results in one of the finest illusions of running water.

Painting on Glass.—When the light is to be transmitted through the glass, the colours should either be properly burnt in, or be painted on with " transparent " colours, such as those used for lantern slides.

Whenever the light is to be reflected from the glass, the latter may be painted with powerful opaque colours.

Change of Voltage.—The voltage of the electric light supply must be determined by circumstances. One or two small lights are preferably supplied at 2 or 4 volts pressure from an accumulator. Similarly a row of miniature street lamps can most conveniently be wired in parallel and supplied by an accumulator.

More powerful illumination is preferably supplied with the usual 110 or 220 volt house service.

In all cases the wiring, insulation and safety devices and all fittings must be strictly in accordance with the requirements of the Fire Insurance Societies and the Standard Rules approved by the authorities.

Model Street-lighting Scheme.—One of the most remarkable models ever made is shown in Figs. 102, 103 and 104. It measures some seventeen feet in length and represents a street-lighting scheme. In 102 it is shown by day and before the model was finished, and, in 103, at night with the miniature lamps lit.

The third picture shows the controlling switchboard and some of the hundreds of wires in the lighting circuits.

The model was built strictly to scale by Mr. B. Audsley, of New Jersey, for the General Electric Co., Ltd., of Schenectady, U.S.A., to demonstrate the relative lighting efficiencies of different lighting methods.

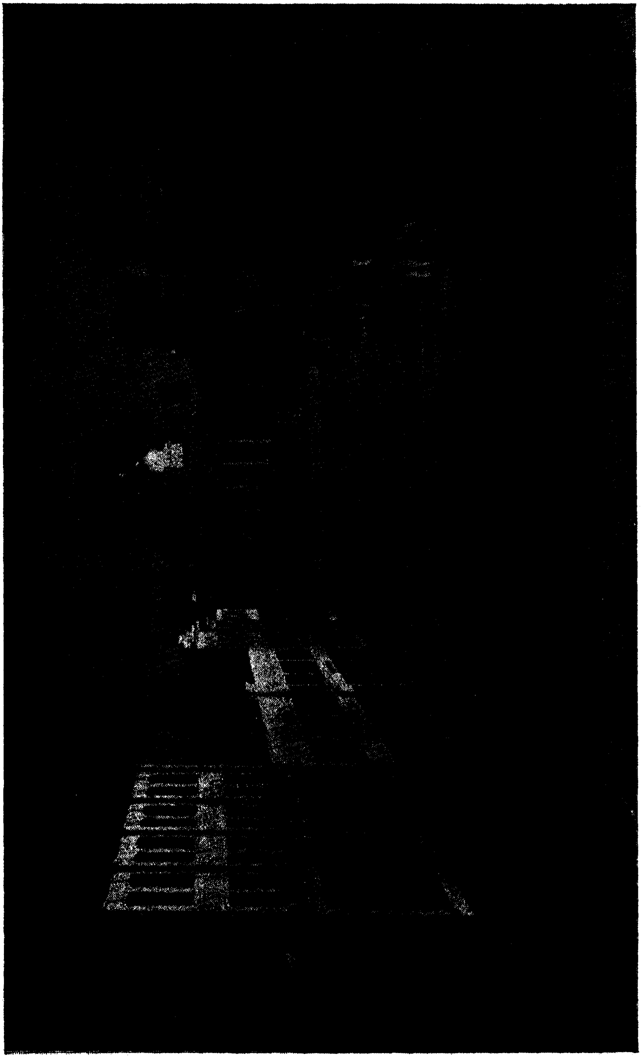

FIG. 102. STREET SCENE BY DAY.

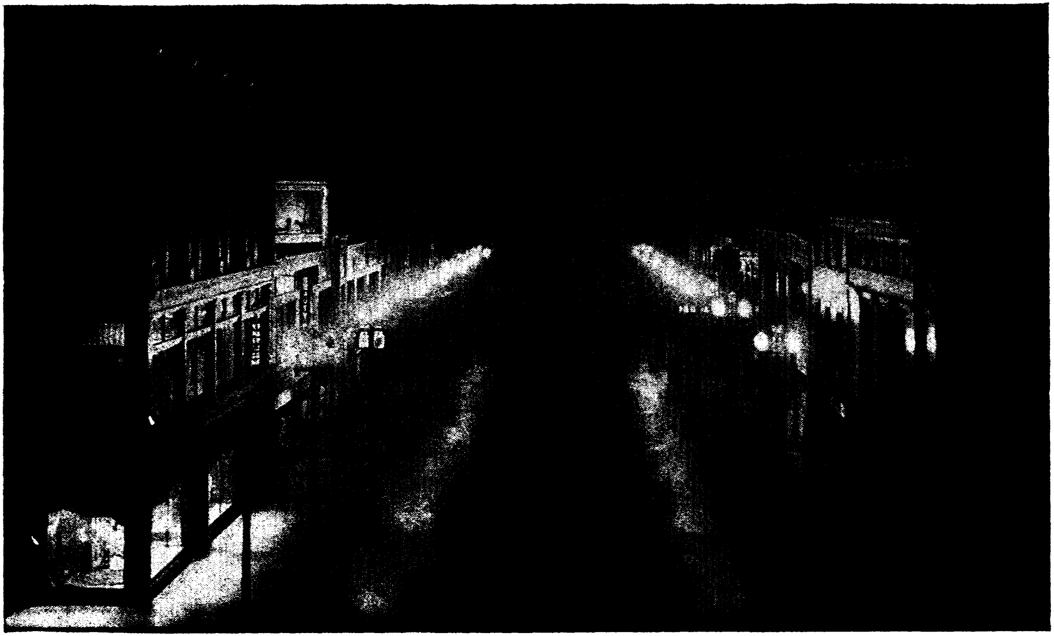

FIG. 103. STREET SCENE ILLUMINATED BY NIGHT.

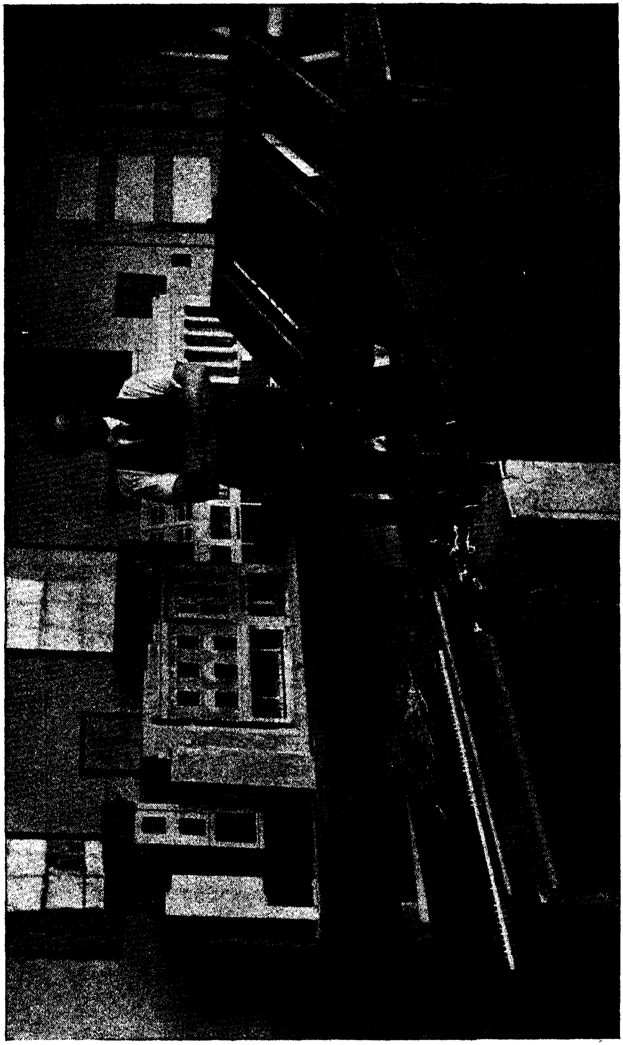

FIG. 104. THE SWITCHBOARD AND CONNECTIONS DURING CONSTRUCTION.

By means of the controlling switchboard any desired combination of flood lighting—high or low street lamp illumination—and various systems of shop window lighting can be demonstrated with absolute fidelity to the original.

The model was used for display purposes at an International Convention of Illuminating Engineers and must be acknowledged to be one of the finest scenic models in the world.

CHAPTER XV

Showcases and Stands

THE construction of small showcases is by no means a difficult matter; that in Fig. 105, for example, is admirable for the average small scenic model or diorama.

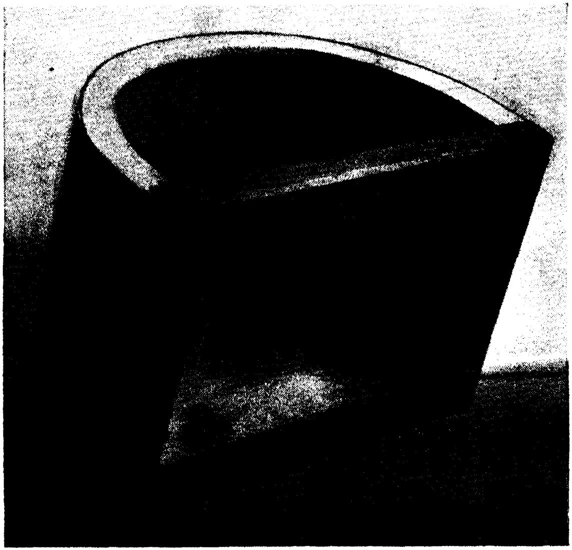

FIG. 105. SHOWCASE WITH CIRCULAR BACK.

Showcase with Curved Back.—It consists of a solid base with a curved back, and a similarly shaped top which is pierced for the admission of top light. The front is composed of flat timber, and the curved back made from one strip of plywood.

The whole is glued and pinned together and the front stained and polished.

Glass in the front panel is secured by internal beading and the top may be glazed or covered in with a shaped board on which any needful electric bulbs can be fitted.

Glass Cases for Small Models.—Glass showcases up to 15 ins. or so in length, 12 ins. in width and 9 ins. in height or thereabouts can be made as shown in Fig. 106.

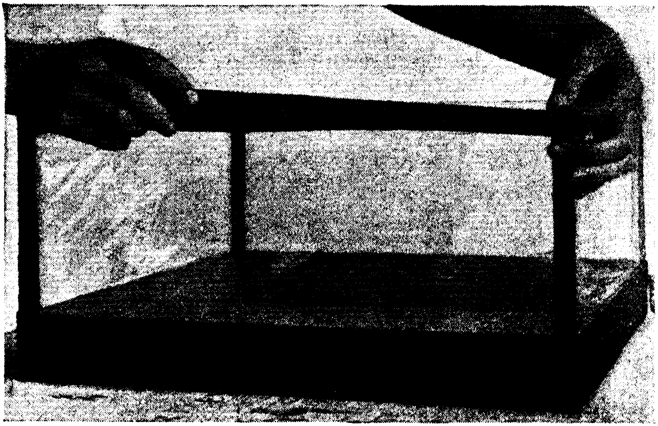

FIG. 106. BINDING THE EDGES OF THE GLASS.

The top and the four sides are cut from ordinary window glass; the side glasses are then fitted into a groove on the upper edge of the wooden frame and secured on the inside with passe-partout binding.

Fix the corners of the glasses by gumming strips of passe-partout binding to them, and add narrower strips over the inside corners. Then put the top glass in and fix it in the same way. Thoroughly clean the inside of the glass, and paint or stain the woodwork.

The Base of the Glass Case.—The base of the case should be made of good dry timber—ordinary ⅜-in. five-ply board is admirable. It should have a moulding glued and pinned to it so that the wooden frame of the glass cover can drop into the recess formed by the moulding.

Showcase Made with Wooden Strips.—A simple case with wooden sides can be made of square section wood about ½-in. square for the corner posts and top members.

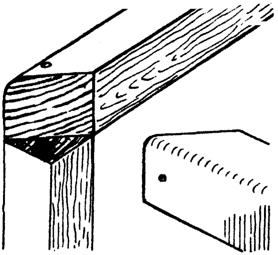

FIG. 107. MITRED CORNERS OF SHOWCASE MOULDING.

The top corners are mitred, as in Fig. 107, and glued together while flat on the table. A fine panel-pin is driven through each corner, and the wood then rounded off at all outer corners and edges. The corner posts are then sawn to exact length, and the lengthway pieces of ½-in. by 1 in. wood cut square and true.

Making the Frames.—Glue and pin the corner posts to the ends of the horizontal pieces, thus completing the lower frame and corner pieces. Then glue the top frame on top of the corner posts and secure each with a very fine panel pin.

Glue and pin narrow beads of stripwood on to the inner faces flush with the front, as in Fig. 108; cut the glass panels to fit easily; black the edges of the glass and secure them with beadings on the inner sides.

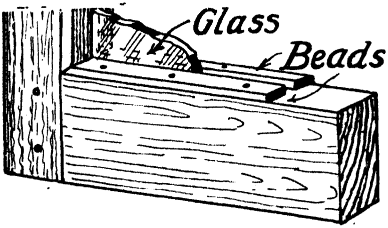

FIG. 108. HOW THE GLASS IS FIXED BY BEADINGS.

Polish the wood framing and prepare a suitable flat baseboard, with an inner part to fit inside the frame of the glass case. Add four small feet as in Fig. 109, clean and polish the whole, and the showcase is complete.

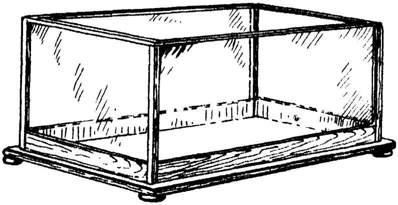

FIG. 109. FINISHED SHOWCASE.

Exhibition Showcase.—A splendid example of a professionally made showcase for a working model locomotive is shown in Fig. 110. This was the work of Bassett-Lowke, Ltd., and represents a Chinese State Railway locomotive, which is shown in motion when required, through the agency of an electric motor concealed in the lower part of the mahogany stand.

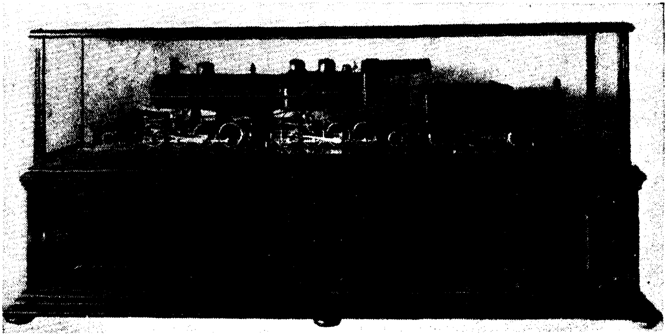

FIG. 110. SHOWCASE FOR WORKING MODEL.

Large Oak Showcase.—The constructional work on a large oak showcase, some 18 ft. in length, is shown in Fig. 111. The weight of this case is about a ton, all parts being of good sound oak; the back is made with removable panels.

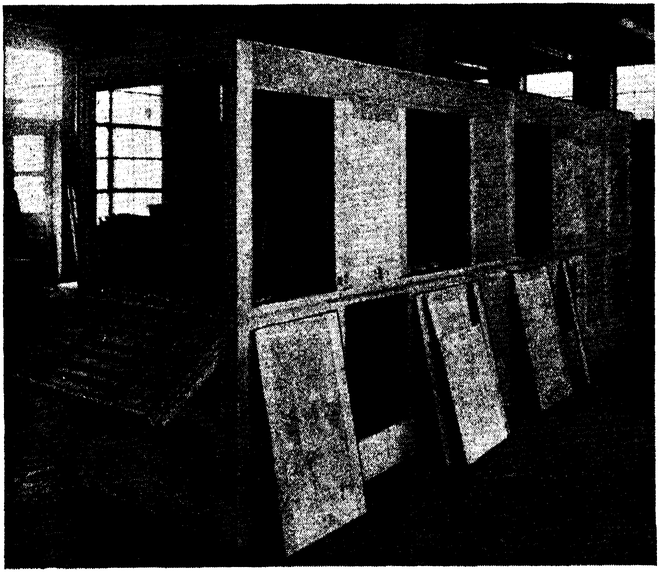

Fig. 111. Constructional Work on a Showcase for a Scenic Model.

It was made for the street-lighting model, illustrated in Fig. 102, Chapter XIV, and shows the drawer at the left-hand end, pulled out and lowered into place in readiness to receive the control switches seen in Fig. 104, Chapter XIV, which are operated when the drawer is opened, but cannot be interfered with when it is closed and locked.

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